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THE UNITED STATES
STRATEGIC BOMBING SURVEY

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FIELD REPORT
Covering Air-Raid Protection
and Allied Subjects in
NAGASAKI, JAPAN



Civilian Defense Division

March, 1947

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Civilian Defense Division
Dates of Field Team Survey:
11-16 November 1945
Date of Publication:
February 1947

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FIELD REPORT

This report was written primarily for the use of the U. S. Strategic Bombing Survey in the preparation of further reports of a more comprehensive nature. Any conclusions or opinions expressed in this report must be considered as limited to the specific material covered and as subject to further interpretation in the light of further studies conducted by the Survey.

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FOREWORD

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The United States Strategic Bombing Survey was established by the Secretary of War on 3 November 1944, pursuant to a directive from the late President Roosevelt. Its mission was to conduct an impartial and expert study of the effects of our aerial attack on Germany, to be used in connection with air attacks on Japan and to establish a basis for evaluating the importance and potentialities of air power as an instrument of military strategy for planning the future development of the United States armed forces and for determining future economic policies with respect to the national defense. A summary report and some 200 supporting reports containing the findings of the Survey in Germany have been published.

On 15 August 1945, President Truman requested that the Survey conduct a similar study of the effects of all types of air attack in the war against Japan, submitting reports in duplicate to the Secretary of War and to the Secretary of the Navy. The officers of the Survey during its Japanese phase were:

Franklin D'Olier, *Chairman.*

Paul H. Nitze, Henry C. Alexander, *Vice Chairmen.*

Harry L. Bowman,

J. Kenneth Galbraith,

Rensis Likert,

Frank A. McNamee, Jr.,

Fred Searls, Jr.,

Monroe E. Spaght,

Dr. Lewis R. Thompson,

Theodore P. Wright, *Directors.*

Walter Wilds, *Secretary.*

The Survey's complement provided for 300

civilians, 350 officers, and 500 enlisted men. The military segment of the organization was drawn from the Army to the extent of 60 percent, and from the Navy to the extent of 40 percent. Both the Army and the Navy gave the Survey all possible assistance in furnishing men, supplies, transport, and information. The Survey operated from headquarters established in Tokyo early in September 1945, with subheadquarters in Nagoya, Osaka, Hiroshima, and Nagasaki, and with mobile teams operating in other parts of Japan, the islands of the Pacific, and the Asiatic mainland.

It was possible to reconstruct much of wartime Japanese military planning and execution, engagement by engagement and campaign by campaign, and to secure reasonably accurate statistics on Japan's economy and war production, plant by plant, and industry by industry. In addition, studies were conducted on Japan's over-all strategic plans and the background of her entry into the war, the internal discussions and negotiations leading to her acceptance of unconditional surrender, the course of health and morale among the civilian population, the effectiveness of the Japanese civilian defense organization, and the effects of the atomic bombs. Separate reports will be issued covering each phase of the study.

The Survey interrogated more than 700 Japanese military, government, and industrial officials. It also recovered and translated many documents which not only have been useful to the Survey, but also will furnish data valuable for other studies. Arrangements have been made to turn over the Survey's files to the Central Intelligence Group, through which they will be available for further examination and distribution.

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I. INTRODUCTION

1. *Relative Importance of Nagasaki.* a. Nagasaki's best days were those prior to Admiral Perry's entry in 1854, when for two centuries it had been the only Japanese port open to foreign (Dutch) trade. With the opening of the entire country to foreign commerce, Yokohama and Kobe gradually became the primary ports for servicing large vessels and for bulk shipments to China, thus bypassing Nagasaki which slowly declined in relative importance to eleventh place among the cities of Japan.

b. As Nagasaki yielded its position as a port to the rapidly expanding ports of Yokohama and Kobe, it was natural that industrial concerns, looking for unemployed labor and low costs, should find in Nagasaki a profitable location. The economic domination of the city thus passed into the hands of large concerns with headquarters in Tokyo and Osaka, which established shipbuilding plants, fish canneries and cotton textile factories. A large number of small machine shops and old one-family handicraft enterprises continued to operate in many parts of the city.

c. Nagasaki's significance, prior to the air raids, was largely due to four factors:

(1) It was the port nearest to Shanghai, China, and therefore, continued to be a transshipment point for passengers and express goods.

(2) It contained one of the big shipbuilding plants of Japan, which was considerably enlarged during the war for both naval and mercantile ship construction.

(3) With the expansion of the war into China after July 1937, and into southeast Asia after December 1941, Nagasaki became a staging area and transshipment point for Japanese troops.

(4) In common with all of the larger cities of Japan, Nagasaki experienced a conversion and an expansion of industry for war purposes.

d. Nagasaki prefecture had an extremely irregular configuration consisting largely of peninsulas extending in every direction from the city, including 217 rural towns and fishing villages, and five cities (Nagasaki, Sasebo, Omura, Isahaya and Shimabara). Sasebo had a preraid population of 205,989 and ranked with Yokosuka and Kure as one of the three principal naval bases

of Japan. The city and the fortified zone around it were dominated by the navy, but technically, at least, were under the administrative jurisdiction of the Nagasaki prefectural government.

2. *Area and Population.* a. The area of the city of Nagasaki was 36 square miles and of Nagasaki prefecture, 1,574 square miles. The populations of the city and the prefecture from 1 January 1940 to 1 September 1945 are given below:

	Nagasaki Prefecture	Nagasaki City
January 1, 1940.....	1,296,883	275,460
January 1, 1941.....		279,524
January 1, 1942.....	1,523,868	280,524
January 1, 1943.....		282,564
January 1, 1944.....	1,444,531	286,439
January 1, 1945.....		276,741
September 1, 1945.....		153,610

Although there was a definite decline in population of the city because of the earlier air raids, the sharp drop indicated by the figures for 1 January and 1 September 1945 occurred very largely in August as a result of the atomic bomb of 9 August.

3. *Physical Aspects.* a. Nagasaki was built on three sides of an oval-shaped harbor, and extended from the eastern side (the oldest and largest section of the city) around the northern end and well into the western side of the harbor. Because the harbor was so closely surrounded by hills and mountains, the city was built on their lower slopes and on reclaimed land. Thus, viewed from the air, it resembled a gigantic amphitheater. The age of the city and its peculiar topography resulted in crowded, crooked, narrow streets, some of them so steep as to require steps.

b. In spite of the long period of foreign (western) influence, Nagasaki was decidedly less modern and possessed fewer up-to-date fire-resistant structures than Kobe or Yokohama. The newer industrial sections and the emergency war installations in the area north of the harbor were also largely flimsy wooden structures.

c. The vulnerability of the city to air raids was partially offset by two factors:

(1) The city was built around a body of water and was bisected by a number of small streams;

(2) Important sections of the city extended up into valleys, the intervening ridges thus affording protection which was especially evident in the case of the atomic bomb.

4. *Effects of Air Raids and the Atomic Bomb.*

a. The areas affected by air raids and by the atomic bomb of 9 August 1945 are indicated on the map of Nagasaki (Reference Item 1).

b. Casualties and property damage were as follows:

	Casualties		
	Raids prior to atomic bomb (9 Aug. 1945)		Casualties due to atomic bomb
	Nagasaki Prefecture	City of Nagasaki	City of Nagasaki
Dead.....	1,340	346	125,761
Injured.....	1,107	600	230,460
Missing.....	75	34	1,927
Homeless families.....	16,557	273	21,174
Homeless individuals.....	68,462	1,623	89,780

	Property damage prior to atomic bomb (9 Aug. 1945)		Property damage due to atomic bomb, City of Nagasaki
	Nagasaki Prefecture	City of Nagasaki	
Houses bombed:			
Totally destroyed.....	203	185	2,623
Partially destroyed.....	233	207	5,265
Houses burned:			
Totally burned.....	12,510	61	11,361
Partially burned.....	101	6	150
Factories bombed:			
Totally destroyed.....	10	1	23
Partially destroyed.....		11	24
Factories burned:			
Totally burned.....	5		85
Partially burned.....	3		
Office buildings bombed:			
Totally destroyed.....	1	2	2
Partially destroyed.....	3	2	2
Office buildings burned:			
Totally burned.....	28		33
Partially burned.....	2		
Schools bombed:			
Totally destroyed.....			4
Partially destroyed.....	3	1	
Schools burned:			
Totally burned.....	10		15
Partially burned.....	1		

¹Materials for this field report were obtained in Nagasaki by the Civilian Defense Division less than 90 days after the atomic bomb fell. Official data on casualties are incomplete, the figure given here representing only verified deaths as of 6 Nov. 1945. The governor stated that actual deaths would exceed this figure considerably but that no estimate was possible.

²This figure represents the number actually hospitalized for injuries in Nagasaki. Since the area directly under the atomic bomb was on the northern side of Nagasaki many of the injured were taken to other towns and cities and would, therefore, not appear in the Nagasaki records. It is estimated that an additional 25,000 persons were injured, making a total of 55,460.

c. Because of its configuration, Nagasaki possessed natural geographical defenses against the widespread effects of bombs, and that fact was particularly demonstrated in the atomic bomb attack. The damage might have been considerably greater had the city not been divided into compartments by mountain spurs and the harbor.

5. *Estimate of Civilian Defense Forces.* a. In theory, at least, the whole city (with the exception of the aged, the sick and the children), was mobilized during an air raid through the civilian defense organizations. The approximate number of those concerned with air defense in the city of Nagasaki as of July 1945 was:

Policemen	332
Firemen	287
Members of auxiliary police and fire units.....	3,000
Members of harbor auxiliary police and fire units	325
Railroad employees (emergency repair squads) ..	210
Support from neighboring railroad division when required	(400)
National Communications (emergency repair squads)	450
"Special first-aid unit" (squads for disposal of dead bodies)	250
Emergency medical	
Doctors	182
Nurses	925
Emergency Public Works Construction Group...	115
Guard rescue unit	65
Neighborhood groups: 5,000 (15 to 20 families in each group)	
Adult able-bodied individuals (estimated)...	140,000
Total	146,141

b. In addition to the above, factories and other enterprises maintained sizable employee air-defense organizations for the protection of their own properties. Very seldom were there any full-time air-raid-defense workers, regular employees performing the necessary duties when needed. The shipbuilding division of the Mitsubishi Heavy Industries, for example, had an organization divided as follows:

In Fire-fighting units (including full-time fire-fighting force of 70)	3,749
In guard units	2,233
In first-aid and gas-defense units.....	2,217
In smaller specialized units such as light control, and repair	1,361
	9,560

c. All able-bodied adults were thus presumably mobilized for air defense. It should be noted, however, that the same individual might have had two quite different responsibilities, contingent upon where he was and what he was doing at the time of a raid.



Photo 1. 2500 feet south of GZ. Looking north. Total damage by blast and fire.



Photo 2. Same area as seen in photo above. Looking east.



Photo 3. 1500 feet northeast of GZ. Blast and fire damage. Looking southwest.



Photo 4. Looking southeast from a point directly over the Nagasaki Prison. This hillside was crowded with typical Japanese wood-frame houses. In the upper portion of the photo can be seen the northwest corner of the Nagasaki Medical College.



Photo 5. 1500 feet from GZ. Aerial view looking west at Chinzei School.

II. SPECIAL CIVILIAN DEFENSE AGENCIES

AUXILIARY POLICE AND FIRE UNITS (KEIBODAN)

1. *Introduction.* In the city of Nagasaki the regular prefectural fire department was established only in 1943. Prior to that time the auxiliary police and fire units operated all fire services in the city of Nagasaki, as they still did in all areas of the prefecture at the time of this report, with the exception of Nagasaki City and Sasebo. A fuller treatment of the fire services and the rivalry that arose with the establishment of the regular fire department is treated in the subject entitled "Fire Services."

2. *Organization.* There were 170 auxiliary police and fire units in Nagasaki Prefecture, 4 of which were located in Nagasaki City. The areas of these 4 units were coterminous with those of the 4 police districts of the city. Each unit in the city was composed of approximately 1,000 members, although that figure was not set by decree and could be changed to fit individual areas. The auxiliary police and fire units in Nagasaki adopted the "Bundan" system, i.e., they were divided into from 8 to 13 subunits, the subunit being the actual operating body, with the unit headquarters acting as the coordinating agency. Each subunit had from 70 to 80 members divided into two arms:

a. *Fire Arm (Shobobu).* This arm contained approximately 30 members who engaged exclusively in fire fighting. The personnel was divided into squads in whatever way was considered most efficacious in the individual subunit. Equipment consisted of motorized and hand fire pumps.

b. *Guard and Medical Arm (Keigobu).* This arm, consisting of approximately 40 members, was divided into 3 squads as follows:

(1) *Guard Squad (Keibihan).* The duties of this squad consisted of traffic control, guiding to shelters, conduct in shelters, assisting in the cordoning off of areas rendered dangerous by unexploded bombs, and other police functions. It contained approximately 15 members.

(2) *The Air Defense Squad (Bokuhan).* This squad which also contained approximately 15 members was responsible for the dissemination of air-raid warnings, enforcement of light control, observation of enemy planes and fires, distribution

of emergency supplies, execution of emergency repairs, and all duties which did not specifically fall under the jurisdiction of other squads.

(3) *The Sanitation Squad (Eiseihan).* The 10 members of this squad were charged with the duties of first-aid, antigas protection and decontamination, epidemic prevention, and postraid decontamination.

3. *Officials.* The officials of the auxiliary police and fire units of the city of Nagasaki, none of whom received a salary, were as follows:

a. *Leader.* The leader was elected by the members of his unit, his name being then submitted through police channels to the governor of the prefecture, from whom he received his actual commission. This election generally took the form of a unanimous approbation of only one nominee. In cases, however, when more than one man was nominated, actual selection was made by the leaders of the several subunits. The leader had no set term of office, and continued his duties until such time as he felt himself either to have lost the confidence of the members or to have become incapable of fully performing his duties. If, under such circumstances, the leader refused to resign he could be impeached by the members or removed by the governor, although informants could not recollect any such occurrence. His duties consisted of the general supervision and coordination of the unit, and he presided at the unit's meetings which were not set for definite times, but were usually held once a year, or at such times as the leader felt necessary.

b. *Assistant Leaders.* Although the regular table of organization called for two assistant leaders, most units had only one. He was appointed in the same manner as the leader, for an indefinite term. His duties consisted of assisting the leader and of replacing him when he was absent.

c. *Leader of the Subunit.* The leader of the subunit was chosen by popular acclaim of the members of his subunit, after which his name was submitted to the chief of the local police district for approval, through the leader of the unit. He

too served an indefinite term and his duties consisted of executing the orders of the leader of the unit with respect to his own subunit. At the time of a raid, although the leader of the subunit was responsible to the leader of his unit, he did have the power to dispatch his own subunit's equipment without permission from the latter.

d. *Assistant Subunit Leader.* This officer was optional among the subunits. He was selected in the same manner as the leader, served for an indefinite term, and assisted the leader, replacing him, if necessary.

e. *Arm Leaders.* These were chosen in the same manner as the subunit leaders for an indefinite term and were responsible for the operations of their particular arms.

4. *Equipment and Training.* Training of the unit members was executed in the subunits, with the subunit leader in charge. He attended a one week training course in the Nagasaki air-defense school (Boku Gakko). There were no habitual training meetings within the unit, but regular police and fire department members were occasionally dispatched to the subunits for instructional purposes. The equipment of the units in Nagasaki was similar to that of corresponding units described in previous reports. A full account of the specifications of the equipment contained in the fire arm, however, will be found in the section of this report entitled "Fire Services." Equipment was supplied through popular subscription of citizens living in the area under the unit's jurisdiction.

5. *Operations.* The chain of command during an air raid was the logical one: unit leader to assistant leader, to subunit leader, to assistant subunit leader, to arm leader, to squad leader, to the individual member. The unit, in time of raid, was responsible to the local police and fire stations for reporting all incidents which it handled. As the outstanding feature of any report on the Nagasaki area is the effect on operations of the unit during and after the explosion of the atomic bomb, the experiences of the leader of the unit in whose area the center of the explosion occurred is of interest. The members of the several subunits of this unit had gathered before 1100 on 9 August 1945 at the sounding of the "alert." When the "alarm" came, they stood by their equipment ready for action, but upon the sounding of the "release-from-alarm" most of the members began to leave the subunit headquarters to return home. It was just at that time that the

atomic bomb exploded. Immediately following its explosion, all members who were able returned to their subunit headquarters, and orders from the police station were received for each subunit to execute its duties to the best of its ability in its own area. This particular unit lost approximately 100 members and 6 out of 13 motorized gasoline fire pumpers as a result of the explosion.

6. *Postwar Prospect.* In Nagasaki City the auxiliary police and fire units were still in operation, but on a greatly reduced basis. Each unit had only 200 to 300 members and in most cases the number of subunits had been slashed in half. The remaining forces, however, were capable of doing a certain amount of fire fighting, as well as fulfilling other auxiliary police and fire functions in case of flood, earthquakes, or hurricanes. They were also prepared to assume police functions such as the prevention of looting and the formation of posses to hunt criminals. Informants denied, however, that the auxiliary police and fire units could, or would, be used by the government to suppress any revolutionary measures on the part of the people.

7. *Water Auxiliary Police and Fire Unit (Suijo Keibodan).* Nagasaki also had a water auxiliary police and fire unit which differed from the ordinary units in its use of fire and rescue boats in place of motorized pumpers. A detailed summary of this unit will be found in another section of this report, entitled "Harbor Air-Raid Protection and Port Security".

Rural Auxiliary Police and Fire Units

8. *Introduction.* Because of the importance of these rural units, an investigation was made of the auxiliary police and fire unit in the village of Yagami, located approximately seven miles (11.3 kilometers) from the city of Nagasaki, in Nagasaki Prefecture. It had a population of 7,132 and its main pursuits were agriculture and fishing. The town suffered one small raid on 28 July 1944, when approximately 30 small American planes dropped sixteen 100-pound high-explosive bombs, one of which did not explode. There were no casualties and little damage to houses, except for some broken windows. Again, only a few panes of glass were broken by the atomic bomb explosion over Nagasaki, although the townspeople saw the flash and heard the explosion.

9. *Organization and Operation.* The local police station was a branch of the Nagasaki City

police district. The fire-fighting service was provided by one auxiliary police and fire unit which was divided into 8 subunits, with approximately 55 to 60 members in each. These, in turn, were broken down into two arms:

a. *The Fire Arm (Shobobu)*. The fire arm of each subunit had 4 squads, each containing from 4 to 13 members. Although the duty of this arm was primarily fire-fighting, the members were prepared to join in other duties in the event of flood, earthquake, or similar calamity.

b. *The Guard Arm (Keibibu)*. This arm was broken down into 3 squads, 4 to 10 men comprising a single squad:

(1) *The Air Defense Squad (Bokuhan)*. This squad was responsible for dissemination of all air-raid warnings, for observation of fires in its area, and for enforcement of light control.

(2) *The Sanitation Squad (Eiseihan)*. The duties of this squad comprised first-aid, antigas protection and decontamination, the welfare of air-raid sufferers, and the execution of mortuary services.

(3) *The Guard Squad (Keigohan)*. This squad was responsible for traffic control, emergency repair and labor, and other police air-raid functions.

In time of air raid this unit dispatched equipment and reported incidents in much the same manner as the city units. At the time of the "alert", the leader of the unit, his assistants, and one messenger from each subunit gathered in the unit's headquarters while all other personnel stood by in their assigned subunit headquarters. At the time of this report, the rural auxiliary police and fire units were still intact and prepared to function in the event of natural calamities.

10. *Leaders*. a. The leader of the auxiliary police and fire unit was appointed by the leaders of the several subunits; his name, in turn, was submitted through the local police chief to the governor of the prefecture, from whom he received his actual commission. His term of office was indefinite, being in this respect similar to that of the leader of the units in the city of Nagasaki. His duties consisted of supervising and coordi-

nating the actions of his unit and he received an annuity of 35 yen as a token salary from the villagers.

b. *Assistant Leaders*. The two assistant leaders were appointed in the same manner as the leader, for an indefinite term. They received 15 yen per year.

c. *Subunit Leader*. This leader was elected by the members of his subunit for a term of 2 years. It was not necessary that his election be approved by anyone else. He received a salary of 10 yen per year, and was responsible for executing the orders of the unit leader as they applied to his subunit.

d. *The Assistant Leader of the Subunit*. This assistant was elected in the same manner as the leader of the subunit, likewise for a term of 2 years, and at a 10 yen per annum salary. His duties consisted merely of assisting the subunit leader and of replacing him in case of his absence.

e. *The Arm Leaders*. The arm leaders were elected by members of their own arms for a term of 2 years. They received no salary.

f. *The Assistant Arm Leaders* were elected in the same manner as the arm leaders for the same term.

11. *Equipment*. In the Yagami auxiliary police and fire unit all equipment was distributed among the subunit headquarters. There was only one motorized gasoline pumper in the unit. The fire arms of all the subunits, except the one which possessed this pumper, were equipped with hand pumps.

12. *Comments*. Organization and training of the auxiliary police and fire units and subunits in Nagasaki were similar to those already reported. They operated satisfactorily in the early raids and at the time of the dropping of the atomic bomb on 9 August 1945 they had already assembled upon the sounding of the "alert" signal. Even though the central units suffered considerable casualties and loss of equipment they continued to combat fires, render aid to the suffering and to perform any service possible with their depleted forces after the explosion. Their continued activities at this time reflected creditably on the caliber and esprit of these units.

NEIGHBORHOOD GROUPS (TONARI GUMI), BLOCK ASSOCIATIONS (CHOKAI), FEDERATED BLOCK ASSOCIATIONS (RENGO CHOKAI)

1. *Introduction*. In the city of Nagasaki the neighborhood group system was operated much the same as had been found in other target cities.

In this and previous reports, reference has often been made by informants to a rural community association (Burakukai) which replaced the block

association and federated block association in the village and rural areas. A brief study of this organization is also included in this report.

Neighborhood Group (Tonari Gumi)

2. *Organization.* There were approximately 5,000 neighborhood groups in the city of Nagasaki, which, during the war, contained approximately 20 families to a single group. In the city of Nagasaki the term "neighbors' mutual assistance" (Rimpo) was used synonymously with neighborhood group. It should be noted that here it was not a subordinate organization of the neighborhood group, as it was in Kobe.

3. *Leaders.* The leader of the neighborhood group was elected by popular acclaim of his constituents. His name was then forwarded to the mayor of the city through the leader of the block association (Chokai) for approval. His term of office was one year and he received no salary. He had an assistant leader who was selected in the same manner and for the same term. The duties of the leader consisted of passing on to the people of the group all information he had received from the block association and of promoting the welfare of his people. The leader was charged with the supervision of air-raid duties within his group of families, but in case he was unable to fulfill such duties he would usually appoint his assistant as air-defense leader. If neither of these men was fit to serve as air-defense leader, a special air-defense leader was appointed by the group leader. The duties of the air-defense leader of the neighborhood group consisted of directing the air-defense functions of the group.

4. *Functions.* The normal peacetime duties of the neighborhood group of Nagasaki were similar to those that have been reported in previous target studies. At the time of an air-raid alert, the individual families of the neighborhood group were responsible for seeing that all fire-fighting buckets and crocks were full of water and that hand pumps were available. The air-defense leader had previously designated certain members of the group to operate the hand pumps, and others to keep on the lookout for enemy planes, fire incidents, and violations of light control. He had appointed messengers, men to take charge of the ladders, stretcher bearers, and other personnel to see that buckets and crocks were constantly filled with water. At the time of the explosion of the atomic bomb in Nagasaki, the release from

alarm had sounded and the citizens had been returned to a condition of alert; consequently, most of the people were entirely off guard, especially as on the previous day they had been kept in a condition of alert the greater part of the time without any actual raid developing. After the explosion, the neighborhood groups moved all their women, children, aged and infirm to the hills as quickly as possible while at the same time transferring their wounded to higher echelons of emergency first aid. The neighborhood groups were still in operation in Nagasaki and were performing their peacetime functions of promoting savings, of tax collecting, sanitation, rationing, and communal repair.

Block Association (Chokai)

5. There were 300 block associations in the city. Before the organization of the block associations in April 1939 there existed in Nagasaki, as previous investigation had shown to exist in Kobe, an organization called the "sanitation group" (Eisei Kumiai), which was an extremely ancient institution. Before its metamorphosis into block associations it had, in addition to its sanitary duties, performed functions such as the collection of taxes, the encouraging of savings, the operation of rationing, and other duties currently executed by the block associations. The block associations of Nagasaki were divided administratively into eight sections:

a. *Welfare Section (Koseibu).* This section was charged with the duty of visiting sick members, of supplying relief to members who were in want, and of helping jobless members to find employment.

b. *Sanitation Section (Eiseibu).* Duties of this section were the observation of general sanitary conditions within the association, the prevention of the spread of epidemics, and the preservation of the general health of the citizens of the association.

c. *Women's Section (Fujinbu).* This section was concerned with communal gardening by women, communal care of children whose mothers were temporarily absent, and supervision of women's matters in general.

d. *Savings Section (Chochikubu).* The duty of this section was the encouraging of savings.

e. *Taxation Section (Nozeibu).* City, prefectural and national taxes were collected by this section for the area of the block association and

were then turned over to a like section in the federated block association which paid the taxes to the city office. These taxes were collected first in the neighborhood group by the neighborhood group leader.

f. *The Soldiers' Assistance Section (Gunjin Engobu)*. This section made small articles of clothing for the comfort of soldiers.

g. *The Spiritual and Cultural Section (Shido Kyokabu)*. This section handled the ritual of ceremonies, the training of the people in Japanese culture, and their inculcation with the doctrine of Shinto.

h. *The Defense Section (Boeibu)*. This section was in charge of the enforcing of light control in the association's area, the dissemination of air-raid signals, the training of the people of the association in air-defense duties, and the passing on of air-defense information, such as home fire-fighting methods, to the people. With the exception of the leader of this section, all the other section leaders were regular neighborhood group leaders. The defense section, however, was composed of a special leader who was a member of an auxiliary police and fire unit and who resided in the association's area, of an assistant leader, and of four or five active members who were also auxiliary police and fire unit members. These unit members had a special arrangement with the unit to which they belonged, which allowed them to stay in the block association's area at the time of a raid. The air-defense equipment of the block association consisted of approximately five hand pumps which supplemented the pumps which might be possessed by the individual neighborhood groups, and also stretchers, buckets, and ladders.

Federated Block Association (Rengo Chokai)

6. There were 25 federated block associations in the city of Nagasaki with approximately 20 block associations to each federated block association. The mission of the federated association was to act as a channel of liaison from higher organizations (prefecture, city and ward) to lower echelons (block association and neighborhood group). Its leader was selected by a meeting of the block association leaders in the area, this selection being approved by the mayor of the city. Usually the leader of the federated block association was the leader of a block association as well. He served a term of 2 years and received

no salary. His duties consisted of the supervision and operation of the various functions of the federated block associations, including information concerning such matters as rationing, savings, and air-defense procedure, and of presiding at the regular meetings which were usually held once a month and at the special meetings which he called whenever he felt they were necessary. He had either one or two assistant leaders who were selected in the same manner as he, for a term of 2 years. Administratively, the federated block association was divided into the same eight sections which have been previously described under "Block Associations". The leaders of these eight sections were appointed by the leader from the ranks of the block association leaders who formed the body of the federated block association. An exception was the defense section leader who was the head of a subunit (Bundan) of an auxiliary police and fire unit, and who was selected because of his special training and knowledge in air-defense functions. Since the area of the subunit was usually coterminous with that of a federated block association, he was the logical head for supervising the operations of all fire-fighting functions in the federated block association's area.

Rural Community Associations (Burakukai)

7. *Introduction*. This organization was studied in the village of Yagami which had a population of 7,132 and was located approximately seven miles northeast of Nagasaki City.

8. *Organization*. In this rural area there existed the neighborhood groups as well as these community associations, but the neighborhood groups were used chiefly for channeling of instructions and information to be passed on to the general public. This rural community association had its roots in very ancient times in Japanese history and had functioned under many names. There were 22 community associations in the subject village, each one composed of approximately three neighborhood groups, and there were approximately 90 families to each community association. Regular meetings were held once a month; special meetings, as necessary. The headquarters was in some cases in an office and in other cases in the leader's house.

9. *Leaders*. The leader of the rural community association was selected by popular vote,

each household in the association's area voting as one unit. His name was then automatically approved by the mayor and forwarded to the governor of the prefecture, from whom he received his commission. His term was 1 year and his duties consisted of the supervision of all the functions of the associations. There was one assistant leader appointed in the same manner and for the same term as the leader.

10. *Functions.* The usual peacetime duties of the rural community association consisted of those which were generally performed in the cities by the block and federated block associations, i. e., the supervising of rationing, encouraging of savings, and collecting of taxes. Additional wartime duties consisted of passing on information to the people, of supervising air-raid preparations in the individual households, and of cooperating with the local auxiliary police and fire unit. At the time of an air raid the only special duty of the rural community association was assuring that every one in the area had received

the proper signal. It possessed no fire-fighting apparatus. The neighborhood group leaders supervised the air-defense operations of the individual household and was in turn supervised by the rural community association. This community organization was still in active operation in Yagami and was performing its normal peacetime functions at the time of the investigation.

11. *Comments.* Neighborhood group officials interrogated indicated that limited operations on 9 August 1945 continued in spite of the chaos and pandemonium that existed generally throughout the area affected by the atomic bomb. Although many of the neighborhood group members in the affected area fled the scene, some remained behind, and they, with the assistance of members from the undamaged sections of the city, concentrated their efforts on securing medical attention for those injured by the blast and in seeking shelter in the hills for those rendered homeless and those whose instinct was to get as far from the terrific disaster as they could.

III. ORGANIZATION AND OPERATION OF JAPANESE CIVILIAN DEFENSE

AIR RAID WARNING

1. *Introduction.* The study of the Nagasaki air-raid warning system has turned up several interesting features. Here was discovered, for the first time in the field investigations, the use of an early warning signal prior to the "alert" and the delegation by the Western Army headquarters to a subordinate military headquarters the authority to direct air-raid "alarms". In as much as directives for announcement of air-warning signals were received in Nagasaki Prefecture from the Western Army headquarters in Fukuoka, no investigation has been made of the sources of detection of enemy aircraft which were available to that headquarters, but, as in Kobe and Kyoto, the study of this subject begins at the point where the army had directed the civilian authorities to sound the signals, and describes how the municipal officials passed the warning on to the public. The jurisdiction of the Western Army for purposes of authorizing air-raid signals covered an area including all of the Island of Kyushu and the prefecture of Yamaguchi on the Island of Honshu—all the territory of the Japanese mainland to the southwest of that covered by the Central Army, except the area of the Sasebo naval base, in which the navy exercised jurisdiction.

Air-Raid Signals

2. *Authority to Announce Public Signals.* As is indicated in the preceding paragraph, the direction to sound public air-raid warnings, except as indicated below, came from the Western Army headquarters in Fukuoka. This headquarters was the center into which all information of the approach of enemy aircraft was focused. From early information the army was able to determine the possible target of the raiders and to give warning to the areas concerned. A subordinate unit of the Western Army, hereinafter referred to as the Nagasaki Garrison, was stationed in the city, but it had no independent means for early detection of enemy raiders. Because of the exposed location of Nagasaki, and in recognition of the possibility of

surprise raids there because of the mechanical limitations of radar and the time lag in channels of communication, the Western Army delegated to the Nagasaki Garrison the authority to sound the "alarm" upon the appearance of planes, after the "alert" had been directed by the Western Army headquarters, or even without the preliminary alert, if the planes had been able to sneak in without detection. The Nagasaki Garrison was authorized to direct the sounding of the "alarm" throughout the area of Nagasaki Prefecture, excluding the area of the Sasebo naval base (within which the navy assumed the responsibility of giving warnings), and also the islands of Iki and Tsushima. Army garrisons in these two islands were likewise delegated authority to direct the sounding of the "alarm." It is to be noted that these army garrison forces had no independent means of enemy plane detection which were not available to the Western Army headquarters. They were, of course, closer to the coast and could receive prompt reports of the sighting of enemy planes; furthermore, they received reports from radar stations and from air-defense observation posts at the same time those reports were transmitted to the army headquarters. Other than this partial delegation of authority among military authorities, the procedure for giving air-raid warnings was consistent with the description heretofore given in other reports, i. e., the army was the judge of the proper time at which public warnings should be given; civilian officials had no discretion and were required to give warnings as, when, and if the army so directed. The orders of the military within Nagasaki Prefecture were received in the air-defense section of the prefectural government and from there disseminated throughout the prefecture. In the city of Nagasaki the army orders were received from three sources: (1), the prefectural office; (2), the local army garrison; and (3), a local telephone communications office which received its information from a similar communications center in Fukuoka, con-

nected directly with the Western Army headquarters.

3. *Types of Signals.* The manner by which the "alert," "alarm" and "release-from-alarm" (reversion to "alert" status) were announced, being nationally prescribed, was the same in Nagasaki as has been described in previous reports. The use of the "release-from-alert" ("all-clear"), being left to the discretion of the army headquarters, was not prescribed in the area under the jurisdiction of the Western Army. There was, however, an additional signal prescribed by the Western Army in October 1944 for its own area—an early warning signal which was sounded even before the "alert." This signal was given only by sirens and was announced by one short blast. The purpose of this preliminary caution signal was to warn people to turn on their radios in anticipation of air-raid announcements and to alert operators of individually controlled sirens to be prepared in the event directions to sound further siren warnings were forthcoming. This new signal was not sounded on the occasion of every threatened raid but only on those occasions when warning of the approaching planes was received in sufficient time to authorize this signal in advance of the normal time for sounding the "alert."

4. *Methods of Announcing Signals.* a. *Sirens.* Sirens in Nagasaki, as in other target cities studied thus far, were the chief means of announcing air-raid signals. It is particularly interesting to note that the 11 sirens by which the city of Nagasaki was warned were not centrally controlled. Upon the receipt of air-raid signals, telephone messages were sent to the sirens located farthest north and south. As those sirens and the one on the prefectural building sounded, the other sirens went into action, either by picking up the sound of the first sirens, or by being warned over the telephone from the city office. Such a procedure for sounding sirens was obviously unsatisfactory; it gave rise to time lags among the several sirens and on many occasions the sirens were sounding

different signals. Informant stated that the officials were fully aware of the inefficiency of the system and had been trying for some time to secure sufficient materials to place all the sirens under a central control. Another interesting feature was the fact that the four sirens in the Mitsubishi plants were an integral part of the siren coverage of the city, which was considered adequate by the city officials, except possibly in a few small pockets in the hills. There is attached hereto as Exhibit A a list of the locations of the 11 sirens by which the city was warned and the accepted range of coverage of each. Reference Item 2 is a map of the city of Nagasaki showing the actual location and range of sirens.

b. *Radio.* Radio announcements of signals were made by the Western Army headquarters from which a transmitter broke into the normal public broadcasts.

5. *Comments.* a. Authorization of the "alarm" signal by the Nagasaki garrison, a unit of the Western Army, took into consideration the likelihood of sneak attacks, the time lag in receiving directions from the army headquarters in Fukuoka, and the possible disruption of communications. This was a worthwhile procedure in view of the exposed location of Nagasaki. On 9 August, however, the army failed to take advantage of the Hiroshima experience and neglected to give the public the "alarm" signal.

b. The sounding of the "release-from-alarm" in Nagasaki at a time when only a few planes had been flying over the vicinity, might have been justified in view of the desire to release the area from an "alarm" status as soon as possible. In view of the Hiroshima experience 3 days before, however, it would appear that the army authorities should have profited from that experience and have kept the area under an "alarm" status regardless of the number of planes observed and should have advised the public of any experience gained from the dropping of the atomic bomb on Hiroshima.

CONTROL CENTERS

1. *Introduction.* In the investigation of the organization and operation of control centers in the Nagasaki plan of civilian defense, little deviation was found from that already reported heretofore. Here again, there were two real operating control centers: first, in point of operation, the

control center of the sub-unit (Bundan) of the auxiliary police and fire unit (Keibodan), and second, the main control center of the prefectural police. The auxiliary police and fire unit maintained an active headquarters during periods of air raids for over-all supervision of the operations

of its subunits, but it was from the latter unit that emergency services were dispatched. For a complete discussion of the organization and operation of the auxiliary police and fire unit and its subunit, see section entitled "Auxiliary Police and Fire Unit".

2. *Operation.* a. *Control Center of the Subunit.* Reports of all incidents of bombing were made by the leader of the neighborhood group (Tonari Gumi) to the headquarters of the subunit. Included in such reports was an indication of whether or not the incident was of such proportion as to require help from this headquarters. Two services were available for dispatch here: the fire arm, and the guard and medical arm. The leader of the subunit control center then recorded the location of the incident on an operations map of the area under his command and dispatched such services as he deemed necessary. Immediate reports of the incidents were rendered by the subunit control center to the appropriate unit headquarters, from which reinforcements from other subunits were requested if the incident continued out of control.

b. *Control Center of the Prefectural Police.* Consistent with the uniform plan found in all target cities investigated, the main control center for supervision of all air-raid protection facilities in the prefecture was organized and operated by the police division of the prefectural government. Here was assembled during air raids all official personnel who might in any way be required to supervise or assist in operations of services during the emergency. Reports of all incidents and the services dispatched to combat them were received at this office and recorded on an operations map to which all had access.

(1) *Services Dispatched Solely From Prefectural Center.* In the main, air-raid services were dispatched from their own operating headquarters immediately upon receipt of the report of an incident, at or before the time reports were submitted to this headquarters. Other sections of this report describe the dispatch of emergency services in the several echelons of air-raid defense from the neighborhood groups, the block associations, the subunit of the auxiliary police and fire units and the municipal fire department. There were, however, certain services which were assembled during periods of air raid and dispatched solely from this control center. These services were:

(a) *Guard Rescue Unit (Keibitai).* For a discussion of the organization and its operation, see section entitled "Rescue".

(b) *Special First-Aid Unit (Tokebetsu Kyugotai).* For a complete discussion of the organization and operation of this unit, see Emergency Medical Section of this report under subheading "Mortuary Service".

(c) *Telephone Repair Squad.* This group was trained and equipped for emergency repair of telephone lines running to the control center.

(2) *Personnel of the Prefectural Control Center.* This main control center was located in a well-constructed concrete shelter in the side of a hill some distance from the prefectural building. It consisted of a main operations room which contained the operations map and in which most of the staff assembled; a room for the private use of the head of the police division when he was not on duty in the main operations room; a communications room in which all messages were received and dispatched; a room for the governor and his chief aides; and a small room used as the store place of the emperor's photograph. Personnel of the control center and their duties were as follows:

Governor. Director and over-all commander of the control center.

Head of the People's Affairs Division. Assistant to the governor; supervised living conditions and political activity of the people and education within the prefecture.

Head of the First Economic Division. Assistant director; supervised production of food and agriculture.

Head of the Second Economic Division. Assistant director; supervised production of timber and operation of small factories and utilities.

Head of the Police Division. Chief of staff and actual leader of the control center.

Head of Police Affairs and Guard Section. Matters concerning control and leadership of the municipal police and fire services and of auxiliary police and fire units; matters concerning food supply, salary and vacation of persons necessary in communication installations and guard duties.

Head of the Secret Police and Foreign Sections. Matters concerning the control of propaganda, political situation, and political peace.

Head of Labor and Buildings Section. Matters concerning emergency repair, emergency labor, and building material.

Head of the Emergency Welfare Section. Matters concerning the reception and assistance of refugees and air-raid sufferers.

Head of Public Works Section. Matters concerning air-defense public works and emergency repair of roads and bridges.

Head of Information Section. Assistant to the chief of staff.

Head of the Air-Defense Section. Matters concerning the control and leadership of fire fighting and fire prevention; inspection and supervision of shelters; supervision of air defense and the dissemination of air-raid warnings; training and employment of the guard rescue units; coordination of air-defense information and reports.

Head of the Economic Peace Preservation Section. Matters concerning the emergency distribution of food stuffs and other material and the continuation of economic peace.

Head of the Criminal Affairs Section. Matters

concerning the identification of corpses and apprehension of war-time criminals.

Head of the Sanitation Section. Matters concerning first-aid, antigas, epidemic prevention, and water supply.

3. *Comment.* The main control center in Nagasaki was the first of any examined, which was located in a bombproof shelter in the side of a hill. The staff of the control center was on duty at the time of the atomic bomb explosion on 9 August 1945, and it is interesting to note that, although a steel door at the base of a vertical ventilating shaft was blown off its hinges, none of the staff members was injured by the explosion. The wisdom of the location of this center was brought home forcibly to the Nagasaki officials, for the prefectural building in which the main control center had been located previously was totally destroyed.

INCIDENT CONTROL

1. *Sequence of Control.* The system of incident control as described in previous field reports was also practiced in the prefecture of Nagasaki. To summarize, the householder first combated a bombing incident, and if it developed, he received assistance from his neighbors, then from the neighborhood group (Tonari Gumi) leader, which was followed by assistance from succeeding higher echelons of emergency services. As different services went into action, the control shifted accordingly, i. e., the neighborhood group leader was usually the first incident control officer, and he might be succeeded by the leader of the fire squad of the block association (Chokai). Then in sequence might have come the leader of the defense section (Boiebu), followed by the leader of the block association. If the auxiliary police and fire forces became involved, another sequence of control might have prevailed: first, the squad leader of the auxiliary police and fire subunit (Bundan), then the arm leader of the subunit, followed by the assistant leader of the subunit, the subunit leader, the assistant leader of the unit and finally, the unit leader himself. Still another chain of control might have been involved, should the municipal fire services have been summoned, namely, from the squad leader up through any superiors who might have come to the inci-

dent. It should not be inferred, however, that the sequence was complete in each cycle since, for example, it was rare for the over-all leaders of the several services to exercise authority at the scene of an incident, and often certain of the services were not required.

2. *Command Precedence.* In addition to the basic principle of command sequence as described above, two collateral principles prevailed: when units of the same echelon were concerned, the senior officer retained control; when reinforcements from a like service arrived, the officer of that service already on duty retained command.

3. *Comments.* During the investigation in Nagasaki, the question of possible confusion in their system of incident control was again posed to officials experienced with the procedure. They indicated satisfactory operation during periods of air raid and found nothing from the atomic-bombing experience which suggested to them any need for a change in their procedure, for on the occasion of the atomic bombing one huge incident was created and this came immediately under the control of the prefectural police department, not passing through the usual steps of succeeding control of lower echelons.

UNEXPLODED BOMBS

1. *Introduction.* Occasion was afforded at this target to interrogate a bomb-disposal officer of the Nagasaki Garrison of the Western Army to verify the procedure for disposal of unexploded bombs after the report of the existence of such a bomb had been received by the military from the civilian authorities. The precautionary measures taken by the civilian authorities prior to the arrival of the army bomb-disposal squad and the channels of reporting of unexploded bombs have been previously discussed. No variation therein was found in Nagasaki.

2. *Operation.* Two bomb disposal squads were attached to the Nagasaki Garrison, and one to each outlying military unit. Reports of unexploded bombs were made by municipal officials to a designated military organization, from which the bomb squad was dispatched. The disposal squads in this area consisted of four men, all of whom had been trained in bomb disposal procedure at the Western Army headquarters. These men actually participated in the handling and disposition of the bomb; the laboring work was performed by members of the auxiliary police and fire units (Keibodan). Upon arrival at the scene of the incident, the squad first inspected the bomb or the crater in an effort to determine the

type, size and location of the missile. If this examination showed the size of the cordoned area to be insufficient, directions were given to increase its size. If the examination of the bomb showed it to be a time bomb, regulation required that it should not be touched for 80 hours, although the period was usually extended to 120 hours. The period of waiting, however, depended upon the location of the bomb with respect to the importance of the area in which it was located. If the bomb were lying adjacent to an important installation, utility or communication artery, immediate efforts were made for its disposal. Both time bombs and duds were rendered harmless by the thermite burning process described in the Osaka report.

3. *Comment.* During 1944 the bomb disposal squads in this area were kept busy handling small unexploded bombs, described as about six or seven inches in length and about three inches in diameter, which were mixed with incendiaries. Informant stated that approximately half of these small bombs failed to explode as well as many incendiaries, separately and in bundles. After 1945, however, the percentage of unexploded bombs was considerably lower and very few unexploded bombs were handled.

FIRE SERVICES

Fire Protection

1. *Introduction.* The information in this report of Nagasaki City was obtained by interviews with officials of the fire and water departments, including the two former fire chiefs; by checking fire department records; inspecting fire equipment and the remaining fire stations; inspecting harbor police boats; and in addition, by inspecting several types of buildings. (For list of persons interrogated see Exhibit B.)

2. *Nagasaki Prefecture Fire Department Section.* a. *Organization.* (1) *First Fire Chief.* Prior to 15 January 1943, all fire fighting was done by the fire fighter group of the auxiliary police and fire unit (Keibodan). As the result of a Ministry of Home Affairs law, a full-time fire-fighting section was established under the protective guard department (Keibika) of the prefectural police bureau. Y. Ishimatsu, a division

police chief, was named the first chief of the fire department section. A battalion headquarters and four substations were established in the city and six of the oldest auxiliary police and fire unit pumpers were placed in those stations. The fire chief was authorized to employ 80 firemen. After numerous attempts to recruit fire fighters, 23 former auxiliary firemen were employed, but it was not until November 1943 that this number was increased to 70. The fire chief, never having had any fire-fighting experience, worked under a tremendous handicap. The fire-fighting section of the police protective guard department became a stepchild in the prefectural government overnight. No new fire equipment was purchased, and the auxiliary firemen were noncooperative to the point of being belligerent. They resented the fire department as they thought it lowered their prestige in the community to be under the direction

of the fire chief at a fire instead of the police as they had been before the fire department was established. The former fire chief stated that the auxiliary firemen would respond to fire alarms only when a fire was near a governmental office or an official's home. After 11 months service, Chief Y. Ishimatsu was ordered by the prefectural governor to resign, but he had sufficient time in service as a police officer to retire. Shortly thereafter he was employed as a fire-fighting instructor by the Great Japan Air-Defense Association (Dai Nippon Boku Kyokai), a national organization. City, town and village police officials, government officials, auxiliary police and fire unit leaders, and neighborhood groups (Tonari Gumi) were in attendance at the classes. He held this position until the end of the war.

(2) *Second Fire Chief.* H. Yoshii was appointed fire chief on 19 November 1943, and served in that position until 16 April 1945 when he was advanced to police chief of the Hirado division, located several hours' distance by train from Nagasaki. Under Chief Yoshii, the fire department increased its personnel to 108 by February 1944, and to 159 in May 1944. Two 350 g. p. m. fire pumps were purchased by the prefectural government and added to the Nagasaki City fire department. Four of the original six auxiliary police and fire pumpers remained in service, the other two being out of commission, making a total of six pieces of motorized pumping equipment in the fire department. In May of 1944, the chief attended a 10-day fire-fighting training course sponsored by the police bureau of the Ministry of Home Affairs in Tokyo. Through the information he gathered at this training course and with the aid of a few text books on fire fighting from the Tokyo Metropolitan Police Bureau, he attempted to train the fire department in the science of fire fighting. In addition to his regular fire department training courses, he conducted a total of 20 half-day lecture and drill sessions for the auxiliary police and fire units which by this time had become more cooperative with the fire department.

(3) *Third and Present Fire Chief.* On 16 April 1945, S. Fujimoto was appointed fire chief, a position he held at the time of this report. The fire department again increased its personnel in May 1945, to a total of 287 men, the number employed at the time of the atomic bombing on 9 August 1945. The fire department had 120 firemen in November 1945; one battalion headquarters,

two sub-stations, and a total of eight 350 g. p. m. pumpers, including the two out of service. One substation and several auxiliary fire department pumpers were completely destroyed by the atomic bomb blast (Reference Item 4). Twelve firemen were killed outright and 28 seriously injured, some of whom died later. Three of the injured firemen resigned and two are still off duty.

b. *Working Conditions.* The two platoon system (24 hours on duty and 24 hours off duty) was in effect for firemen. Their advancement in rank, medical aid, and pension benefits, were the same as in other prefectures. The salary scale was as follows:

BASE PAY

Regular fireman (lowest grade).....	45 yen per month
Regular fireman (2d year).....	55 yen per month
Sergeants	50 yen to 67 yen per month
Two assistant fire inspectors (not fire prevention men).....	65 yen per month
One assistant engine inspector.....	75 yen per month
One fire inspector (equivalent to fire captain)	85 yen per month
One engine inspector.....	75 yen per month
One fire chief (including house).....	1480 yen per year

ALLOWANCES

In addition to the base pay, they received an allowance for subsistence, rental, uniforms, aptitude, and years of service. The additional pay was as follows:

Regular fireman	20 yen plus 5 yen for each dependent
Sergeant	20 yen plus 5 yen for each dependent
Asst. fire inspector....	35 yen plus 5 yen for each dependent
Asst. engine inspector.	35 yen plus 5 yen for each dependent
Fire inspector	35 yen plus 5 yen for each dependent
Engine inspector	35 yen plus 5 yen for each dependent
Fire chief	100 yen per month

All prefectures paid police and firemen allowances in addition to their base pay.

c. *Fire Department Recruits.* During the war, applicants for the fire department were required to have had 8 years' schooling and be not less than 5 feet 1 inch tall, and between the ages of 18 and 40 years. It was then planned to raise the minimum entry age to 20 years.

3. *Auxiliary Firemen.* a. *Organization.* The firemen of the auxiliary police and fire unit as previously mentioned were the only fire fighters in Nagasaki prior to 15 January 1943. In April 1945, there were three auxiliary police and fire units, Nagasaki, Umegasaki and Inasa, with a total of 24 sections of fire fighters. The plan

called for a total of 677 men, ranging in numbers from 24 to 32 men in each section. In actual operation there was a total of 492 men with 9 to 30 men in each section. (Reference Item 5, Charts 1 and 2.)

b. *Duties.* After the inauguration of a full-time fire department section, the duties of the auxiliary firemen became the same as for any other auxiliary police and fire unit in the empire, that of assisting the regular fire department in extinguishing fire.

c. *Training.* It was only during the last year of the war that the auxiliary firemen were willing to recognize the regular firemen and cooperate with them at fires. This was finally brought about when the fire chief was called to Tokyo to attend a 10-day course of training given by the police bureau of the Ministry of Home Affairs. The auxiliary firemen willingly attended the classes which he conducted upon his return to Nagasaki. Prior to that time, the auxiliary firemen felt that they were more experienced, better equipped, and better qualified than the regular fire department. It was probably true that the leaders of the original auxiliary police and fire units were more experienced than the chief even after he attended the school, and their equipment was as good. (Photo 6) Some of these men had been a part of the only fire-fighting units in Nagasaki for many years, and the fire chief was just another police officer heading up a new fire department.

d. *Equipment.* In April 1945 the auxiliary police and fire units had in service 20 motorized pumpers rated at 350 g. p. m.; 53 gasoline-operated 120 g. p. m. hand-drawn pumps; and 12 hand pumps 30 to 50 g. p. m. capacity. All of this equipment was equally distributed in the three districts depending on their size. (Reference Item 5, Chart 4.) Four of the 350 g. p. m. pumps, eight 120 g. p. m. pumps, and four 30 to 40 g. p. m. hand pumps were destroyed by the atomic bomb. (Reference Item 5, Chart 5.) Three motorized 350 g. p. m. pumps formerly operated by the auxiliary firemen had been recently taken over by the American occupation forces for the protection of stores and barracks buildings.

e. *Affiliates.* Block associations (Chonakai) furnished the auxiliary police and fire units with additional fire-fighting equipment, including 287 small hand pumps, 320 sections of 1½-inch linen hose, and 274 quarter-inch nozzle tips. (Reference Item 5, Chart 6.)

f. *Private Fire Brigades.* The Mitsubishi shipbuilding yard maintained 70 full-time firemen and numerous auxiliaries which are covered in detail in this report under "Air-Raid Protection of Factories". The Nagasaki fire chief stated that owing to the newness and inexperience of his department very little assistance was given plants in training their fire-fighting personnel. He stated, however, that on two or three occasions his men visited the shipyard and drilled with the plant firemen. The Mitsubishi shipyard fire brigade was hindered from fighting fires in the city, which were caused by the atomic bomb, owing to obstructed roads in the plant area.

g. *Harbor Auxiliary Police and Fire Unit (Suijo Keobodan).* The water police department maintained two harbor patrol boats which were equipped for fire fighting; one had twin screws, driven by two Script motors and one of these motors could be used to operate a 500 g. p. m. pump. The other boat had a 350 g. p. m. pump driven by a Ford V-8 engine and propelled by a 6-cylinder Diesel engine (Photos 7-8). Each boat was manned by three police officers, assisted by auxiliary firemen. Three additional small boats of 350 g. p. m. capacity were maintained by the harbor auxiliary police and fire units. Two of these auxiliary fireboats were sunk by the atomic bomb blast. The third was in poor condition and of little value. The larger of the two police fireboats was also out of commission. A total of 80 men were members of the harbor auxiliary police and fire unit, and the fire department had no authority over them or the fireboats. The fire chief stated that these boats had been of little value in fighting fires along the water front and in the harbor. He added that on one occasion they attempted to assist the fire department in controlling a fire in several houses along the shore, but it was the land companies that actually extinguished the blaze. On another occasion the fireboat auxiliary crews fought a fire for 2 days on a 600-ton wooden vessel in drydock, and the ship was a total loss. Two small boats with fire pumps were furnished by private companies in the shipyard area and were manned by auxiliary police and fire units. (For details see report on "Harbor Air-Raid Protection and Port Security".)

4. *Fire Stations.* a. *Number Prior to and During War.* There were no fire stations except auxiliary police and fire unit houses prior to 15 January 1945. On that date a headquarters sta-

tion and four substations were established. The stations were known as headquarters battalion station, and Matsugae, Maruo, Inasa, and Ohashi substations (Photos 9-14). Inasa substation was destroyed by a high explosive on 1 August 1945, and Ohashi substation was destroyed by the atomic bomb blast; all the other stations had their windows, doors, ceilings, and roofs damaged. Firemen at the time of the survey were in the process of repairing the damage to these buildings. The two substations destroyed were equipped only with auxiliary police and fire pumpers.

5. *Fire Equipment.* a. *Motorized Equipment.* On 15 January 1943, six of the auxiliary police and fire unit's oldest pumps were assigned to the newly organized full-time fire department. The plan in April 1945 was to increase the fire department's equipment to 16 motorized 350 g. p. m. pumps and 11 hand-drawn gasoline-driven 120

g. p. m. pumps. This plan was to be effected by borrowing pumps from prefectural village and town volunteer fire departments. However, only one pump of each size was acquired from a neighboring community. Currently, the fire department had six pumps in commission and two out of service as none was lost in air raids or by the atomic bomb. All fire equipment lost was auxiliary police and fire unit apparatus (Reference Item 5, Chart 5).

b. *Maintenance of Fire Apparatus.* There was no central repair shop for fire equipment. The municipal government paid for replacement parts on auxiliary police and fire equipment, and repair work was done by auxiliary firemen. Their technical knowledge was poor, and consequently, the maintenance of fire equipment was not good. The fire department apparatus was repaired by auto mechanics in garages of the city and paid for by



Photo 6. An auxiliary police and fire unit (Keibodan) station and one of its 20 pumpers of 350 g. p. m. size. Above station is the first section of the Nagasaki Keibodan.

the prefectural government. All motorized equipment was in poor condition and replacement parts were difficult to procure.

c. *Fire Hose.* Each of the 6 pumps was equipped with 10 sections (65.5 feet per section) of unlined linen 2½-inch hose, with an equal number of sections in reserve. Hose reel carts were not carried on the hose beds as was the practice in other Japanese cities. Sections were rolled separately, not coupled together, and stacked on the apparatus. The only appliances and tools carried on the fire pumps consisted of a 4-inch and a 2½-inch hard suction hose for drafting, a nozzle with 7/8-inch tip, a pike pole (fire hook), an axe and a shovel, and a 2½-inch riser pipe, 3 feet high, for connecting to flush-type hydrants (Reference Item 5, Chart 3).

6. *Training of Firemen.* a. *Training School.* Firemen recruits were given 2 months' training at the prefectural police and fire training school before being assigned to a fire station. Apparently it was a case of the blind leading the blind, as no experienced fire fighters were among the newly organized fire-fighting personnel. Text books procured through the Tokyo Metropolitan Police Bureau were used as a guide for the instruction given. The chief stated that lectures were given on fire-fighting theory and bravery (duty) in fire fighting; practical drills in pump operation; laying of hose lines; and training in military discipline and military drills.

b. *Fire Station Drills.* The chief stated that practical drills were conducted at least once each month in simulating actual conditions, which was



Photo 7. The two boats in center of picture with bows forward, the one on left having white hull, and one on right having smokestack, are the water police patrol boats. These boats were completely hemmed in by other small craft and it took 6 minutes for the boat on the right (outboard) to get under way.

done by building fires in remote spots and having firemen extinguish them. He added that daily drills were conducted in spotting pumps and laying hose lines. Conservation of water was necessary, so that the drills had to be dry runs. Gasoline was also rationed, 5 gallons to each pumper, and long drill periods were not permitted.

7. *Fire Alarm System.* The telephone and one watch tower were the only means of transmitting fire alarms. A person in reporting a fire by phone lifted the receiver and yelled, "Fire, fire!" to the operator. The phone operator, in turn, called the headquarters station where all fires were reported. Direct telephone lines from headquarters to the 4 substations were used by the fireman on phone watch in relaying fire alarms. The watch tower located on top of the city hall was manned by headquarters firemen who changed watch every hour (Photo 15). A direct telephone from the watch tower to headquarters station a short dis-

tance away was used in reporting fires spotted from this vantage point. Although only two-thirds of the city could be seen from this tower, the chief stated that 90 per cent of all fires were reported by it. The total fire alarms in Nagasaki from 1943 to October 1945, other than those caused by air raids, were as follows:

Year	Houses	Ships	Forest (acres)	Loss
1943.....	47	1	21-35.28	Yen 579,147
1944.....	45	5	8-31.36	2,098,072
1945 to October.....	35	4	2-2.69	346,023

8. *Water System. a. Source of Water.* Nagasaki water was supplied from many small streams that flowed into five holding reservoirs, located in the low mountains surrounding the city. All reservoirs were within a mile of the built-up suburbs of the city. (Reference Item 6.) The Ura-



Photo 8. One of the two water police patrol boats, each equipped with a fire pump. Illustration shows two one-half-inch and one three-quarter-inch streams from a 350 g. p. m. pump driven by a Ford V-8 motor.

kami reservoir was located about one-half mile north of the Mitsubishi Ordnance plant, 130 feet above sea level. It was the only one of the 5 reservoirs that did not flow into the distribution system by gravity. Below the dam of this reservoir was the Oide pumping station, equipped with 3 electrically driven pumps, where water was pumped from an underground river and the Ura-kami reservoir to the distribution system. The atomic bomb destroyed the power lines to these pumps, thereby putting this source of water out of service. The Misiyama reservoir was north-east of the city and at an elevation of 270 feet. The Honogochi high and low reservoirs were east of the business district, and the Kogakura, highest of the 5 reservoirs, was south of the city at an elevation of 300 feet. Nagasaki used about

9,868,000 gallons of water per day. The supply was adequate except for an occasional dry spell which occurred only once in 2 or 3 years, and then water was rationed. The normal dry seasons were January to February and August to September. (Reference Item 3.)

b. *Water Mains.* The water mains from the fire reservoirs were 14-inch to 28-inch cast iron pipe and they fed a grid distribution system composed of cast-iron pipe 2½ to 12 inches in diameter. There were many dead ends in the outlying districts, but the system was well looped and cross connected in the congested area, and was well supplied with isolation valves. The high-explosive raids damaged one 2½-inch, four 4-inch, six 6-inch, four 8-inch, and one 12-inch fire mains. All of these mains were repaired within 48 hours.



Photo 9. Nagasaki fire department headquarters building. No space provided to house fire equipment. Partially damaged by atomic bomb, 9 August 1945.

There were three 4-inch, six 6-inch, two 12-inch and one 28-inch known breaks in water mains caused by the atomic bomb, and water had not been restored to an entire section of the city at the time of the survey. The chief of the water department stated that he expected to find hundreds of other breaks when water was restored to that part of the city.

c. *Hydrants.* There were 611 public and 150 private fire hydrants in the city, about 80 per cent being of the flush type and 20 per cent of the post type. All were single 2½-inch hydrants with the Japanese standard snap connection. They were located 110 yards apart in the congested areas and up to 250 yards apart in the suburban areas. Twenty to seventy-five pound pressure was maintained on these hydrants depending on the elevation. The fire department was responsible for flushing the hydrants and the water

department was responsible for the repairs, but there was no regular schedule set up for either flushing or maintenance.

d. *Wells.* There were approximately 10,000 wells in the city, that averaged 3 feet in diameter and had a water level from 5 to 20 feet. Many of these wells could have been used for fire fighting, but no survey had been made to determine where drafting could be done.

e. *Other Sources of Water.* Seven covered underground emergency tanks of 27,500-gallon capacity were located near important public buildings. There were also 100 open emergency tanks of 10,500 to 27,500-gallon capacity and approximately 800 smaller emergency tanks with varying capacities below 10,000 gallons. (Reference Item 7.) Many families dug small pits and lined them with plaster; other families bought the standard rectangular concrete 40- to 70-gallon



Photo 10. Permanent sheds for housing fire equipment, located directly across the street from fire headquarters building.

tanks. All these tanks were filled from fire mains and used for fire fighting. (Photo 16.) The fire department made a survey of the locations along the river and water front where emergency water for fire fighting could be drafted (Reference Item 4). Some of the larger factories had large tanks for fire fighting in their own plants.

9. *Operations Under Air-Raid Conditions.* As has been stated previously, the prefectural fire department in Nagasaki was not organized until 15 January 1943, and considerable dissension thereafter existed between it and the members of the auxiliary police and fire unit. The first air raid of 11 August 1944, when both high-explosive and incendiary bombs were dropped, caused the fire-fighting units to forget their differences and to work together. The next air raid came 26 April 1945, which was followed by additional bombings on 27, 29, 30 and 31 July and 1 August 1945. All

bombs dropped in these raids were high-explosive and the few fires caused by them were quickly extinguished by the fire department and the auxiliary police and fire units.

10. *Comments—Nagasaki Atomic Bombing of 9 August 1945.* The fires following the atomic bombing of Nagasaki spread in all directions from the blasted area. The instantaneous heat wave preceding the blast burned people and scorched wood surfaces, particularly telephone and power poles on the exposed side, for a distance of 2.6 miles in all directions from the zero point. Many wood-frame buildings within the area were completely destroyed by the blast but showed no signs of destruction by fire. Most of the fires caused by the atomic bomb were probably of secondary nature. The flimsy and highly inflammable materials that might have been ignited by radiation from the bomb explosions did not burn



Photo 11. Matsugae Substation. Partially damaged by atomic bomb of 9 August 1945.

because the fire was probably snuffed out by the blast which immediately followed. Fire fighters made no attempt to enter the destroyed areas, owing to the turmoil and confusion within the city, and by the time uninjured fire fighters regained their composure, fires had kindled in blasted buildings and were racing in all directions. At the very height of the fire the wind reversed its direction and fanned the flames back toward the burned-over area. The temporary prefectural building and homes on the north side of the national highway were thus saved from burning. One fire station was completely destroyed by the bomb blast, and the remaining four stations had their windows, doors, ceilings and roofs damaged. Twelve firemen were killed outright by the atomic bomb and 28 were seriously injured, some of whom died later. In spite of the receipt of intelligence of the atomic bombing of Hiro-

shima 3 days before, no consideration was given by the Nagasaki fire officials to withdrawal of fire equipment to the perimeter of vital areas, upon receipt of air-raid warning, or to any other change in their existing plans.

Fire Prevention

11. *Operation.* No organized fire-prevention bureau existed in Nagasaki Prefecture. The fire chief stated that occasionally firemen were detailed from fire stations to inspect fire hydrants, noting particularly whether they were obstructed or leaking; to make notes of closed roads and of burning of rubbish in dangerous areas; and to check short smokestacks on bath houses. The few existing fire prevention laws were the same as in other prefectures. They were broad in nature and were police regulations as promulgated by the Ministry of Home Affairs' Office.



Photo 12. Maruo Substation. Partially damaged by atomic bomb, 9 August 1945.

12. *Building Regulations.* The building regulations for all provinces of Japan were the same. Nagasaki had its narrow streets and congested areas as did other Japanese cities. In the terraced mountains surrounding the city, buildings, mostly farm houses, were not so closely bunched as were the homes and shops in other portions of the city. There were 40 to 50 semimodern buildings 3 stories in height.

General

13. *Mutual Aid.* A plan was set up whereby volunteer fire departments of neighboring villages were to assist Nagasaki in the event of large fires.

No outside assistance, however, was offered in fire fighting immediately following the atomic bombing. Prior to that time no mutual assistance had been needed.

14. *Fire Barriers.* On four occasions in Nagasaki City, beginning in November 1944, buildings were demolished to create firebreaks for the protection of vital installations. A total of 8,929 buildings valued at 39,271,838 yen were removed (Reference Items 8 and 9). The greatest demolition occurred along the north boundary of the Mitsubishi shipbuilding yard where 6,926 buildings valued at 3,706,138 yen were removed. These firebreaks did not diminish the fires which followed the atomic bomb blast.

EMERGENCY MEDICAL SERVICES

1. *Introduction.* In this report the same classification of related subjects is followed as in

previous reports, viz, emergency medical service (Kyugotia), mortuary service (Shitai Shori Ka-



Photo 13. Inasa Substation, made untenable by a high-explosive bomb on 1 August 1945. No fire equipment or men were lost in this station.

kari), and Red Cross activities (Sekujigi Jigyo). The emergency medical service includes first-aid services and hospital services. Although the plan of organization and procedure in carrying out the functions of these several services are similar and, in many instances, identical with those found in previous surveys, local differences have been observed as will be shown in the reports which follow. Among other things, the atomic bomb demonstrated the weaknesses of plans that were based on ordinary air-raids.

Emergency Medical Service

2. *Organization.* The emergency medical service of Nagasaki was organized on a combined municipal-prefecture plan. At the prefectural level, the service was under the authority of the health section (Eiseika), in conjunction with the

police department (Keisatsuhbu), while at the municipal level the service was under the authority of the health section, a subsidiary of the welfare department (Koseibu). The chief of the prefectural health section was in over-all charge of the service and his orders and directives were issued to the municipal health chief through the police department. In the air-defense medical set-up, all doctors, dentists, nurses, midwives and pharmacists were organized into their respective associations and assigned specific duties in the medical installations that were created. These installations included first-aid stations (Kyugo Sho), reserve first-aid stations (Yobi Kyugo Sho), maternity first-aid stations (Josan Kyugo Sho), mobile squads (Idohan), first-aid hospitals (Kyugo Byoin), and special first-aid hospitals (Tokushu Kyugo Byoin). Volunteer workers in the neighborhood groups (Tonari Gumi) and in the aux-



Photo 14. Ohashi Substation, completely damaged by atomic bomb. Nine firemen, the entire complement of this station, were killed.



Photo 15. Fire watchtower, Nagasaki City Hall.

iliary police and fire units (Keibodan) were organized into first-aid squads (Kyugohan). School patriotic groups (Gakko Hokoku Tai) which consisted principally of school girls who had received first-aid instructions, were organized to assist in caring for and treating air-raid casualties.

3. *First-Aid Service.* a. *On-the-Spot Treatment.* Volunteer workers from the neighborhood groups, members of the first-aid squads of the auxiliary police and fire units, and members of the school patriotic groups would go to the scene of disaster and give on-the-spot treatment to casualties. This treatment consisted principally of elementary first-aid measures such as bandaging, splinting, artificial respiration and stoppage of hemorrhage. Casualties, as found, were separated into the various categories of injuries and either

sent to their homes, to first-aid stations, or directly to the first-aid hospitals. Patients who were able to walk to the first-aid stations did so but those who were seriously injured and unable to walk were carried on litters or on the backs of rescuers to the first-aid stations or hospitals by the above-mentioned personnel.

b. *First-Aid Stations.* There were 25 first-aid stations in Nagasaki, located in doctors' homes or in public elementary school buildings. The exact locations of the first-aid stations were listed and placed on the neighborhood group bulletin boards. Insofar as possible, the first-aid stations were located in close proximity to the first-aid hospitals. There were 6 first-aid stations that were specially constructed in accordance with specifications sent to the prefectural health section from the Ministry of Home Affairs in Tokyo. These sta-



Photo 16. Small water tanks for fire fighting, made of dirt and plaster, built by some families. Concrete water receptacles, 40 to 70-gallon size, may be seen in background.

tions were located in the basements of public school buildings and were constructed of reinforced concrete. There was a special steel door at the entrance which was supposed to prevent poisonous gases from penetrating the building, but these stations were not gas-proof, because there was no ventilating system whatsoever in any part of the station. ("Gas Protection Service")

(1) *Personnel in First-Aid Stations.* When an air-raid alert was given, personnel reported to their preassigned location for duty. On the average, depending upon the population of the district served, there were 3 doctors, 2 dentists, 1 pharmacist, and 10 nurses in each station.

(2) *Equipment of First-Aid Stations.* Equipment consisted principally of gauze bandages, cotton, disinfectants, splints, heart and respira-

tory stimulants, and a few drugs, especially those used in the treatment of burns. There were no sulfa drugs and only small amounts of anti-tetanus serum. The shortage of drugs constituted one of the most serious problems. Surgical instruments were not furnished as standard equipment, but were brought to the stations by the physicians assigned there for duty. Surgical instruments and equipment used in giving blood transfusions were sterilized either by pan boiling or by using a small, wood-heated sterilizer that was furnished by the city. There were no beds in the first-aid stations and casualties awaiting treatment were placed on mats (Tatami) or on the floor.

c. *Reserve First-Aid Stations.* There were 5 reserve first-aid stations in Nagasaki City, all located in public elementary school buildings. These



Photo 17. View of Nagasaki City, looking north from fire watchtower, located on top of city hall. This area was shielded from the atomic bomb blast by the hill in the background. Typical of congested areas.

stations were used only in the event the regular first-aid stations were over-loaded with air-raid casualties. There was no specified number of doctors, dentists, nurses, and pharmacists assigned to these stations, the required number being drafted from the first-aid stations far removed from the site of damage or from first-aid stations where there were only a few casualties.

d. *Maternity First-Aid Stations* were apparently nothing more than first-aid stations set up in the three infant and maternity clinics in Nagasaki City, to which midwives and nurses were assigned during air-raid alerts. A special duty of the personnel assigned to these stations was to assist women in childbirth, who had been rendered homeless as a result of the air raids.

e. *Mobile Squads.* During air-raid alerts the

chief of the prefectural health section was located in the air-defense control center which was maintained by the police department. On call from the health section chief were two "mobile" squads of doctors, dentists, nurses, midwives and pharmacists, who were on an alert status at all times to go to any part of the city and give medical assistance or give relief to overworked medical personnel. The term "mobile squads" is a misnomer, because there was no special mobile equipment owned or operated by these groups. The squads were in reality reserve personnel who were called out only if they were absolutely needed.

3. *Hospital Service.* Air-raid casualties who required hospitalization were either sent directly from the scene or from the first-aid stations to the first-aid hospitals. If some specialized form of



Photo 18. A congested section in Nagasaki (Inasa area). Streets are inaccessible to fire equipment and fire fighting is done by "bucket brigades."

treatment was necessary, such as major surgery, or, if a long period of hospitalization was necessary, casualties were taken to the special first-aid hospitals. Within the city of Nagasaki there were 18 hospitals, with a total bed capacity of 1,240; 13 of the hospitals being designated by the health authorities as first-aid hospitals, and 5 as special first-aid hospitals.

a. *Air-Raid Protection in Hospitals.* During air-raid alerts, all ambulatory patients went directly to preassigned locations, either into the basement of the building or into dugout shelters on the premises outside the building. Bed patients were carried on stretchers to the shelters or to the center of the lower floors of the building. Blackouts were enforced during air-raid alarms and strategic points in the hospitals (such as operating and X-ray rooms) were equipped with special blackout curtains.

4. *Transportation of Casualties.* A motor transportation pool was maintained by the municipal government for the transportation of air-raid casualties from the scene of disaster to the first-aid stations and hospitals. During air-raid alerts, the chief of the transportation section was located in the air-defense control center, and upon request from the chief of the health section, dispatched vehicles to the desired location. This system was not satisfactory after heavy air attacks, because the streets and roads in the bombed area were often made impassable by fires, debris, and refugees.

5. *Medical Training.* As in the previous cities surveyed, a delegation of physicians was sent to the army medical school in Tokyo for a refresher course in emergency first-aid measures. Upon their return from Tokyo, members of this delegation gave a required series of lectures to all doctors, dentists, nurses, midwives and pharmacists. The physicians then gave lectures and practical demonstrations to block association and neighborhood group leaders. The neighborhood group leaders gave a series of lectures to the members of their groups. Professors from the Nagasaki Prefecture medical school gave lectures on elementary first-aid procedures to the people through block association channels and to the members of the first-aid squads of the auxiliary police and fire units. The press played a small part on the dissemination of medical information to the people by printing popular articles on air-raid experiences in other localities, but did not publish any articles on specific technical subjects. The radio was

not used as a means of disseminating medical information to the people because it was believed by the authorities that it would be too difficult to present even elementary first-aid instruction in that manner. Printed pamphlets on first-aid measures were not distributed to the general public.

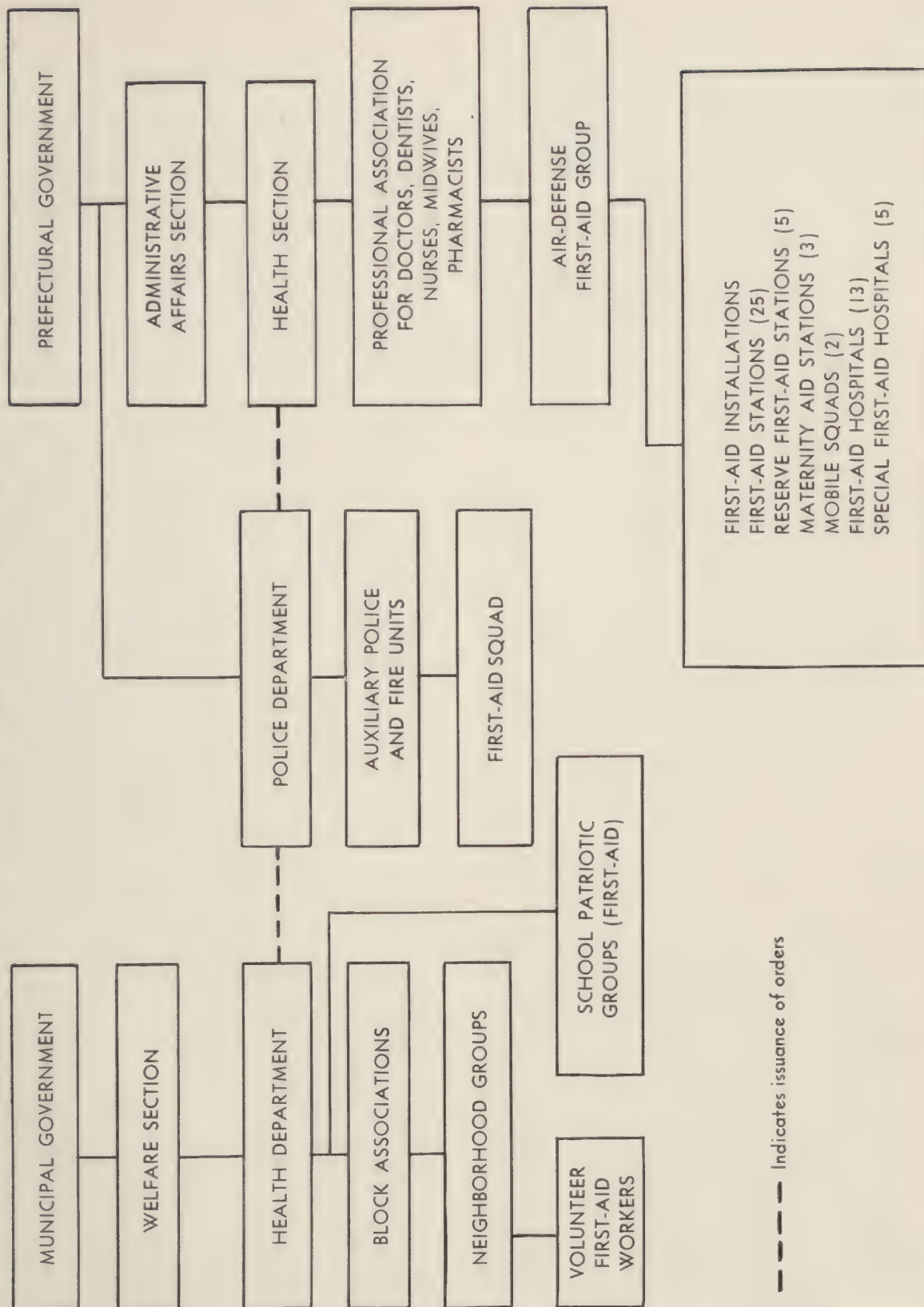
6. *Medical Supplies.* The distribution of medical supplies was essentially the same as that found in the previous cities surveyed. The majority of the drugs and medical equipment was taken over by the army and navy for their exclusive use, and only small quantities were available for civilian use.

7. *Special Comments on Atomic Bomb Raid.* Because of the small number of casualties encountered in the several air raids prior to the atomic bomb raid, the medical set-up was adequate, but as a result of the atomic bomb, the medical service was virtually disrupted.

a. The number of fatalities is discussed under "Mortuary Service". The figures relating to non-fatal casualties are even more problematical than those for the dead. Moreover, there is no clear line of demarkation between them since many who were treated in the first-aid stations and hospitals subsequently died and were listed as fatalities. According to official figures, 30,460 atomic bomb raid casualties were treated at the first-aid stations and hospitals. It is certain that this figure does not represent the total number of casualties because many thousands fled the city unassisted to surrounding cities, villages, towns and rural area. All informants concerned with first-aid work expressed the conviction that the number of injured ran far in excess of the above figures and estimated the number of casualties to range from 45,000 to 60,000.

b. The exact number of injured is not a matter of great moment, but a rough approximation is essential to indicate the vastness of the problem placed almost instantaneously upon the medical organizations. Along with the destruction of virtually every building within the effective range of the atomic bomb, all first-aid stations, and most of the first-aid personnel in that area were lost, thereby increasing the load upon the remaining first-aid facilities. The first-aid stations were reduced from 25 to 10 and the first-aid hospitals from 18 to 5, with a reduction of bed capacity from 1,240 to 240. The number of doctors and nurses who were lost was unobtainable, but at the present time there are only approximately 120 doctors and 683 nurses. For a city the size of

EMERGENCY MEDICAL SERVICE



--- Indicates issuance of orders

Nagasaki, the prewar figures for those two professions should have been at least 50 percent to 75 percent greater. To assist in the crisis, doctors and nurses came in from neighboring cities and villages. A large naval hospital, with a bed capacity of 1,683 was opened to atomic bomb sufferers. Without help from those sources, the first-aid organization would have been completely overwhelmed.

c. Negative answers were received from informants who were asked whether or not many persons died from lack of medical attention. The explanation was that most of those who died were killed immediately. That, however, does not check with the evidence that possibly as many as 20,000 died over a period of weeks following the atomic bomb raid. Moreover, the physical condition of the streets and the inevitable confusion resulting from such a catastrophe placed insurmountable obstacles in the way of transporting the injured to places where they could receive medical attention. The conclusion is, therefore, inescapable that many persons did die from lack of medical care.

d. Some interesting accounts of the delayed effects of the atomic bomb were obtained. The informant, who was an experienced physician and an intelligent observer, and who had occupied the position of director of the prefectural health section for the previous 5 years, cited two classes of effects that were commonly noted: first, that among the survivors of the atomic bomb raid, there were many who developed symptoms of diarrhea with greenish stools and fever which could not be controlled, with death following in 8 to 10 days; second, those who developed a generalized petechial eruption (purpura hemorrhagica) and fever, and died within 14 days. The most frequent symptom noted in those exposed to atomic bomb radiation but who did not die was the loss of hair. That was regarded as the mildest of the demonstrable radiation effects. Other radiation effects in the period shortly after the bomb explosion were cited. Members of rescue squads who worked in the ruins but who had not been exposed to the bomb developed diarrhea and falling of the hair, but none of them died. As an illustration of the intense direct heat generated by the bomb, a small boy was observed who had suffered a severe third-degree burn and loss of hair on the side of his head which had been exposed to the bomb. When he sustained this injury

he was playing in the open at least 1½ miles away from the recognized center of the bomb blast.

Red Cross Activities

8. *Introduction.* The present director of the Red Cross in Nagasaki Prefecture had been in office less than 1 year. The director received his position through nomination by the prefectural governor and appointment by the national headquarters of the Red Cross in Tokyo. Information received in other survey cities has specified in one instance that the Red Cross director was appointed by the prefectural governor, and in another that he was appointed by the national headquarters. The plan employed in Nagasaki Prefecture showed participation of both the prefectural governor and the Tokyo headquarters of the Red Cross in making the appointment, and perhaps more precisely represented the general policy in appointment of prefectural directors. The director had no specified term of office and was subject to removal at any time at the pleasure of the national headquarters.

9. *Functions.* a. The wartime service of the Red Cross was centered principally upon the recruitment and training of nurses for duty with the armed forces. Since the Nagasaki branch had no hospital, the nurses from the prefecture were sent to Osaka for training, the expenses for the training program being borne by the Nagasaki branch. In all, approximately 100 "A"-class nurses, and 100 "B"-class nurses from this jurisdiction were trained in that way during the war, and the majority of them went into the military service. Briefly, the distinction between "A" and "B" classes is that the former are high school graduates and receive 3 years of training, while the latter are accepted from grade schools and are given 2 years of training. There were also 3 groups of graduate nurses, with 70 in each group, recruited from the hospitals within the prefecture and sent, at the expense of the Nagasaki Red Cross branch, to Osaka for a short indoctrination course before entering the military service. As long as nurses were serving on the mainland of Japan they were paid by the Red Cross, but those with the military forces overseas were paid by the military arm to which they were attached.

b. The recruitment of doctors received little or no emphasis on the part of the Red Cross. There were only three doctors employed by it during the war and they were paid on a part-time

basis. The rest of the time they were employed and paid by the University medical school.

c. Training of the civilian public was approached through young people's groups and through women's organizations. The training given in the former instance was along ethical and altruistic lines and was called training in "humanity," whereby the children were taught to help one another without prejudice as to social status. The women's organizations were, however, given technical training in the application of first-aid measures. There were no qualifications for membership in the women's organizations other than the desire to join and receive the instructions, and no fees were charged. In this program, the Red Cross was assisted by doctors from the university medical school. The training was oral and consisted of lectures and demonstrations without a manual for reference or guidance. The course was obviously superficial and nonstandardized since it was given only once or twice each year in one-day sessions. No examinations were given and no certificates were awarded. The first-aid pamphlet, which had been the basis for first-aid instruction to the public commonly found in the other localities, was not used in this city.

d. Supplementing the governmental health program was the most important activity of the Red Cross in peacetime. Special emphasis was placed upon infant and maternal hygiene and care, and "examination of public patients" which latter term is understood to mean the examination of adults primarily for evidences of tuberculosis. A corps of nurses (number unspecified) and one doctor were employed by the Red Cross to carry on work on an itinerant basis where nurses and doctors were scarce or lacking. Patients paid for this service if they were financially able. During the war, however, this program was discontinued due to the shortage of doctors and nurses. In lieu of that work the Red Cross shifted its attention to assistance of the community first-aid program. Upon request from the prefecture, the Red Cross assigned 49 nurses, and 119 student nurses to assist in first-aid stations.

10. *Hospitals and First-Aid Stations.* Whereas the operation of Red Cross hospitals had been the outstanding feature of the Red Cross program in other localities thus far surveyed, the Nagasaki branch of the Red Cross did not own or operate a hospital, nor did it maintain any first-aid stations. A general clinic was, however, main-

tained at the Red Cross administration headquarters, both before and during the war. Formerly, one full-time doctor employed by the Red Cross had carried on this clinic in addition to giving medical service to localities without medical care. When this doctor was taken into the army, he was replaced by three doctors from the university medical school, who were employed on a part-time basis. The clinic was then departmentalized along three main lines: (1) diseases of the eye, ear, nose and throat; (2) internal diseases; and (3) infant and maternal care.

11. *Personnel.* The administrative group consisted of 10 employees in addition to the director. There were 301 nurses trained by the Red Cross who were still in the 5-year service period. When trained by the Red Cross, the nurses had to serve for 5 years under Red Cross direction and supervision. What correlation there may be between this figure and those given for the training of class "A" and "B" nurses was not made clear.

12. *Finance.* There were three classes of membership, each of which was calculated on a paid-up lifetime basis, with the exception of the lowest grade which might be paid at the rate of 3 yen per year for 10 years in lieu of a lump sum payment of 25 yen. The next grade was an honorary membership, obtained by payment of 200 to 1,000 yen, and next, a super-honorary membership by payment of 1,000 yen and up. In Nagasaki Prefecture the memberships were distributed as follows:

Ordinary	96,806
Honorary	1,330
Super-honorary	126
<hr/>	
Total	98,262

Special drives for funds over and above the membership fees were ordered either by the Red Cross headquarters in Tokyo, or by the prefectural branch in Nagasaki. Figures were not obtainable as to what extent special drives were utilized to maintain the current budget, which ranged around 250,000 yen per year.

13. *Comments.* The Red Cross did not play a major role in the support of the war on the home front, nor was its contribution to the war on the fighting fronts highly impressive. It does not appear that its wartime program was greatly different from its peacetime operations. The Japanese Red Cross at Nagasaka played a negligible role in the treatment of casualties resulting from the atomic bomb because it operated no hospitals

or first-aid stations in this prefecture. Unlike the American Red Cross, welfare work did not hold a place of prominence in the activities of the Japanese society, and apparently no assistance was given by this organization to the sufferers from the atomic bomb raid.

Mortuary Services

14. *Introduction.* The mortuary service did not face a crucial test until the time of the atomic bomb. Several previous raids, however, resulting in casualties ranging up to 200 dead, convinced the authorities that the usual methods of small-scale disposal of dead bodies would not measure up to the need in case of a major disaster. It was, therefore, determined that some special agency to take care of this problem should be established.

15. *Organization.* In a situation such as the foregoing where prompt and authoritative action would be required, it is to be expected that the choice of the Japanese should have fallen upon the police department. Since there was no precedent to guide them, a special first-aid unit (Tokubitsu Kyugotai) was devised and arbitrarily attached to the criminal section of the prefectural police department. This service operated through the auxiliary police and fire units (Keibodan). The personnel engaged in the work were further broken down into platoons (Shotai) and sections (Buntai).

16. *Personnel.* The persons assigned to the mortuary service consisted of 20 policemen and 230 voluntary workers who were members of the auxiliary police and fire units. Some of the latter were morticians but not all, as it was a job requiring more brawn and courage than technical skill. The workers were divided into three platoons of approximately 80 men each, and each platoon was divided into 3 sections of about 25 men each. To each section was attached one policeman.

17. *Duties.* The three main duties of the special first-aid unit were: rescue work, first-aid to the injured, and disposal of the dead. It will be observed from the foregoing that the disposal of the dead was only one of the duties performed by the special unit. The policeman attached to each section directed the work of the other members and was also responsible for determining the cause of death in each instance, and for identification of the body, if possible. Once these duties had been accomplished, the dead bodies were then

collected by members of the sections or squads and taken to central points such as school buildings and temples where unidentified bodies were held for further identification by those in search of lost relatives or friends. If identified, the bodies were delivered to the family or friends who were given the option of claiming the bodies for private funerals. The length of time the bodies were held was not fixed, but was determined by the state of the weather, and varied between 24 and 48 hours, after which they were taken to the crematory and burned at public expense. The operation of the service as above described pertains only to the preatomic raids. Special attention will be devoted to the latter in another section of this report. For ordinary raids, however, the plans described appear to have been adequate. The largest number of dead from any one air raid prior to the atomic bomb was about 200, of whom only ten were unidentified. The remainder were all claimed by friends or relatives and consequently disposed of by private funerals.

18. *Equipment.* The special first-aid units had no equipment for disposal of the dead, other than stretchers which furnished the principal means of transportation. Incredible as it may seem, practically all of the dead were transported that way, for two reasons: first, there were no ambulances and there was an acute shortage of trucks; and second, when the atomic bomb struck, the streets throughout the entire area affected were blocked with debris so that vehicle passage was impossible. Where the casualties were few, however, the crematory hearses took care of terminal transportation. Likewise, when casualties were few the crematories furnished fuel for cremation, but when the numbers were large and the crematory was overloaded, wood was collected from the ruins for cremation in the open.

19. *Problems Presented by the Atomic Bomb Explosion.* a. When this catastrophe struck the city, a call was immediately sent out for all members of the special first-aid units, but out of the 250 members only 70 responded. Many of them were, of course, either killed or injured; others had urgent problems at home in caring for their own families so that they could not, or at least would not, disregard what they considered their most urgent duty.

b. The known dead up to 5 November, resulting from the atomic bomb, totaled 25,761; the number missing was 1,927. Those figures were taken from the records of the criminal section of

the police department and are probably the most reliable of all. Perhaps at least 75 percent of the fatalities were instantaneous, which meant that the mortuary service was suddenly confronted with the task of disposing of a prodigious number of bodies. It should be noted that the known dead did not account for the total fatalities, as there were undoubtedly many in the ruins that were never found. The stench of decomposed flesh was said to have hung heavily over the devastated area for weeks. In a casual inspection of one small section of the ruins the skeletal remains of one body which had not been located by the mortuary service was personally observed. In the opinion of the informant, who was the chief of the criminal section of the police department and who had administrative charge of the entire problem, about 70 percent of the deaths resulted from burns either from the direct heat of the bomb or from the resultant fire; about 20 percent from suffocation; and about 10 percent from concussion.

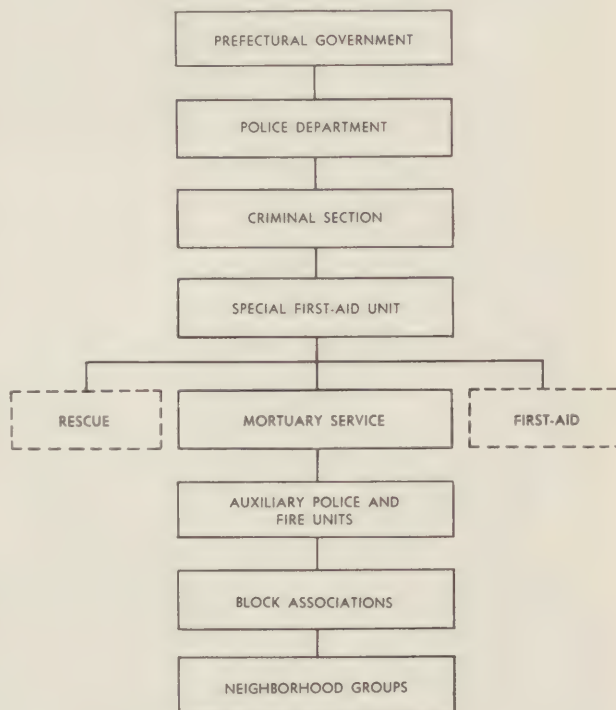
c. The first effort to meet the problems presented by the vast number of dead was to locate and identify the bodies. For that purpose a special group was chosen from the special first-aid unit. At first the heat was so great that they could not enter the stricken area, so their activities were confined to the river banks and other places where the relatively low heat was bearable. Some sections were inaccessible because of the heat for a period of three days or more.

d. Calls were sent for all available helpers within the city and neighboring cities for assistance in caring for the dead. In that way there was assembled a force of about 400 to augment the regularly established personnel of the special first-aid unit.

e. Collections and disposal of the dead followed along the same lines as described for ordinary air raids. The main difference lay in the unprecedented numbers to be handled. Obviously the crematories were unequal to the task. The bodies were, therefore, collected and burned in the open in groups of five. At the university medical school and hospital 807 persons were killed,

of whom about 500 were medical students. A considerable number of students, nurses, and patients survived due to the fact that the buildings were of concrete construction and did not collapse. Most of those who were killed, however, were burned in piles on the hospital grounds. (Photos 19-20).

ORGANIZATION OF MORTUARY SERVICE



20. *Comment.* In the presence of an overwhelming cataclysm such as descended upon the city of Nagasaki as a result of the atomic bomb, no system of mortuary service could measure up to the task. The evidence, however, indicated that the system established here came as near to handling the situation as could be expected. The set-up did at least form a practical working nucleus around which accessory aid was organized and effectively utilized. The presence of police authority in the organization was a stabilizing and directing factor.

RESCUE SERVICE

1. *Introduction.* The purpose of this report is to present the organization of the rescue services, the recruitment and training of rescue per-

sonnel, the methods of rescue technique as used in Nagasaki, and the operation of rescue services under air-raid conditions. The rescue service in

Nagasaki was developed in the same manner as described in the Osaka, Kobe, and Kyoto field reports.

Guard Rescue Unit (Keibitai)

2. *Organization.* The directive, dated 20 April 1944, from the Ministry of Home Affairs ordered the establishment of the guard rescue unit as of 1 May 1944. The cost of the establishment of such a unit was rather heavy and because Nagasaki Prefecture was one of the poorest prefectures, the Ministry of Home Affairs recommended that only one company be organized in Nagasaki. This company operated on the prefectural level and was to provide rescue services for the entire prefecture. The company had two platoons; each platoon was divided into three squads (Organization Chart on following page).

3. *Personnel.* Members of the guard rescue unit were recruited from persons who had applied for positions as members of the prefectural police. The applicants had to be 19 years of age, which was later lowered to 17 years because of the shortage of manpower created by the demands of the military service. A very few of the men accepted ranged between 25 and 30 years of age. No other qualifications were required from the applicant. After undergoing a certain period of training, the men were assigned either to the guard rescue unit or to the regular police force.

4. *Table of Organization.* Each squad was composed of 1 leader and 10 men. Each platoon had 1 leader, 1 orderly, and 3 squads. The company had 1 leader, 2 assistant leaders, 1 orderly, and 2 platoons, the total complement being 75 men. Generally, however, the active duty person-



Photo 19. 1500 feet from ground zero. General view of remaining buildings, Medical College.

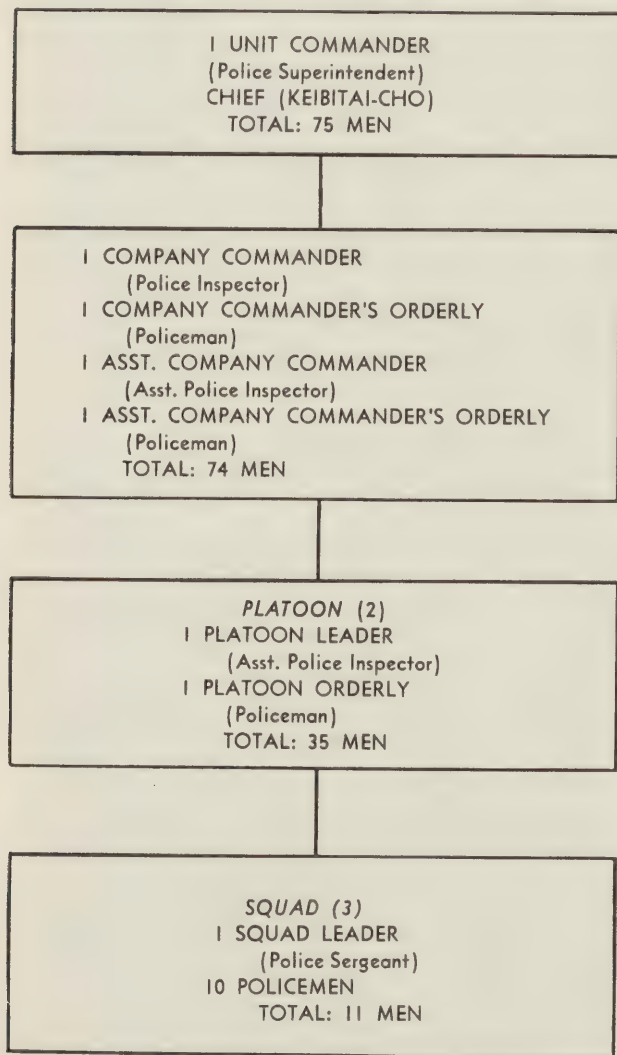


Photo 20. The picture above shows one of the numerous sites where outdoor cremation was done throughout the area devastated by the atomic bomb. Note remains of incompletely cremated bodies.

nel numbered only about 50 men. (Organization Chart below).

5. *Training.* Each selected applicant was sent to training school for instruction in regular police duties such as the study of city ordinances,

ORGANIZATION CHART GUARD RESCUE UNIT (KEIBITAI)



Note: Total personnel, including unit commander, was 75 men. However, due to sickness and other reasons, this force was often not maintained.

the operation of police boxes, and the patrolling of a certain section of the city. This training period extended for 2 months but later, due to the exigencies of war, was reduced to 1 month. At the end of the training period, the men were assigned to either the guard rescue unit or the

regular police, usually on the basis of age, with the younger men generally being assigned to the guard rescue unit where they could continue police training in addition to the specialized training in rescue services. The unit was quartered in dormitories at the headquarters and operated on 12-hour shifts. The company was divided into A and B groups with each group taking its turn on the 12-hour shift. The groups were further divided into two smaller groups, with one group held at the headquarters for 6 hours of training in rescue work and police duties, while the other group performed actual police duties. These two groups reversed their duties at the end of each 6-hour period. With the exception of training in first-aid which was given by doctors, all other training was secured by the study of pamphlets issued by the Ministry of Home Affairs or the Great Japan Air Defense Association, or from reports made by the company and platoon leaders who visited other cities which had been bombed, in order to study rescue technique under actual conditions. Some practical training was had as a result of helping to demolish houses to make firebreaks. Of particular note was the fact that the leader of the guard rescue unit never had any training in rescue technique, as his only duty was to direct the operations of the unit from the control center during actual raid conditions.

6. *Operational Control and Procedure.* The entire company was in the alert stage at all times and, when an air-raid alert was sounded, the men who were off duty and the men who were patrolling areas in the city immediately returned to the headquarters of the unit. When an incident occurred during a raid which required the services of the guard-rescue unit, information was relayed through the police box or the auxiliary police and fire-unit control center to the police station in that area, and then to the prefectural control center from where the chief of the unit notified the company leader, who was stationed with the unit at its headquarters, to dispatch the necessary force. All other procedures and controls were carried out as described in the Osaka, Kobe, and Kyoto field reports.

7. *Mutual Aid.* Since this unit was organized to serve the entire Nagasaki Prefecture, it performed rescue service in other cities on numerous occasions; for example, it aided Omura eight different times, and Sasebo once. The request for this aid came from the chief of police

in the area which desired assistance to the chief of prefectural police in Nagasaki.

Guard Arm (Keicobu) of the Auxiliary Police and Fire Unit (Keibodan)

8. *Organization.* Rescue service in this unit was assigned to the guard and medical arm (Keicobu). (For a detailed description of the auxiliary police and fire unit, see that section of this report.) A shortage of personnel did not permit the members of this arm to be assigned to special duties individually.

9. *Personnel.* The members of the guard and medical arm were arbitrarily selected and assigned by the leader of the auxiliary police and fire unit.

10. *Table of Organization.* This arm was composed of 1 leader with 15 members in the guard squad, 15 members in the air-defense squad, and 10 members in the medical squad. Since there were 4 auxiliary police and fire units in Nagasaki, there were 160 members available for rescue service.

11. *Training.* The leader of the guard and medical arm generally received his training in schools conducted at the police stations but, in some instances, he was trained by the leader of the auxiliary police and fire unit. It was his duty and responsibility to instruct all members of his arm.

12. *Operational Control and Procedure.* The same principles of operational control and procedure as described in the Osaka, Kobe, and Kyoto field reports were employed in Nagasaki.

Rescue Features Common to Both Organizations

13. *Location of Casualties.* The rescue services in Nagasaki employed the identical method presented in the Osaka, Kobe and Kyoto field reports.

14. *Rescue Technique.* Debris clearance methods were the only ones used to extricate the trapped victims.

15. *Equipment.* The same general implements as used in the cities previously investigated were employed in Nagasaki. The guard rescue unit

(Keibitai) had two trucks and a motorcycle with sidecar attachment for the transportation of personnel and equipment and, in addition, had an agreement that transportation would be furnished from the truck pool established at the control center. However, because of the poor mechanical condition of the trucks, the unit traveled to the incidents mainly on bicycles or by foot.

General Comments

16. The lack of proper training and equipment, together with the small number of personnel, prevented creditable performance in rescue operations during raids.

17. There was no heavy rescue equipment and there was an almost complete lack of mobile transport.

18. The entire training program was conducted by inexperienced instructors who trained themselves by the use of civilian defense pamphlets.

19. Unlike that of most other cities, the guard rescue unit performed rescue services in the harbor area.

20. A resume of the operations of guard rescue unit under atomic bomb conditions follows:

a. Since the city was in the "release-from-alarm" or "alert" stage at the time the atomic bomb was dropped, the entire guard rescue unit was concentrated at its headquarters (which was not damaged) directly across from the control center. No personnel or equipment was lost as a result of the bombing. This unit was one of the first civilian defense services to arrive at the incident, but due to lack of training and proper equipment, plus the extremely small number of available personnel, approximately 60 men, very little actual rescue work could be accomplished, so the men were used principally to control traffic (personnel and vehicular); to maintain a semblance of order; to provide information; and to help in road clearance. It is doubtful, however, even if the unit had been trained and equipped, that it could have done very much in actual rescue operations, principally because of the small size of the unit and the tremendous problems created by the bomb.

POST-RAID CLEARANCE

1. *Introduction.* The clearance and repair study of Nagasaki made no significant contribu-

tion to previously obtained information, on either the Japanese planning and execution of meas-

ures for restoring flow of traffic or the use of vital facilities damaged by air attack. Preparations were fewer and less efficient than in cities previously visited, and operations were correspondingly poorer. The comments at the end of the report will present an estimate of these operations with a special reference to the atomic bomb.

2. Road and Bridge Clearance and Repair.

a. *Preparation for Air Raids.* (1) *Administrative.* In Nagasaki Prefecture, the relationship of the road and bridge authorities to air-raid protection took the form of including as one of the members of the control center (Sambo Shitsu) staff, the head of the public works department. It was his duty to report to the control center upon the sounding of the air-raid alert, and there he came under the authority of the prefectural police system. Any urgent calls from local police stations for emergency clearance or repair could be quickly executed by the appropriate public works agency. In Nagasaki City there was little by way of administrative reorganization, for the city was dependent upon the prefecture both for planning and for execution of administrative measures. Construction and maintenance of through streets in the city were the responsibility of the prefecture, while the city was officially responsible for the remaining streets; yet the city leaned heavily in its planning upon the resources of the prefecture despite the fact that the prefectural road chief made the statement that his section had no concern with city side streets. He added that, if the city should fall behind in its street maintenance, he was empowered through the police office to force the city to take proper action. The advent of air-raid threats intensified the city's feeling of dependency.

(2) *The Emergency Public Works Construction Group (Okyu Doboku Kosaku Dan).* Nagasaki Prefecture organized its road and bridge personnel on the basis of the Ministry of Home Affairs' suggestion of December 1943, within a month after the suggestion had been received. The head of the public works department made a special point in stating that "these were suggestions rather than orders although they had the effect of orders". He claimed to have had three separate emergency public works construction groups within the prefecture—one each covering the areas within and adjacent to Nagasaki City and Sasebo City, and a third distributed throughout the prefecture. Investigation showed that there was no such organization operated by Naga-

saki City. Unlike the other prefectures studied, it was stated that the establishment of an emergency public works construction group resulted in a jump from 200 to 837 employees by May 1944, which included 58 office staff and engineers as well as laborers. By May 1945 there were 850 members as follows: 488 unskilled workmen, 36 stone masons, 81 carpenters, 190 "miscellaneous," and 55 office workers. According to the quotas set up by the table of organization on following page, the prefectural emergency group was up to standard. The added personnel were however only part time, although they were paid workers who could be summoned in emergencies; and it is noteworthy that this is the first instance discovered in which the use of auxiliaries was planned for road and bridge work. As will be seen below in the description of actual operations, this planning proved to be of little avail. Two of the companies in the construction group were given two lessons on how to build a pontoon bridge; the others had no training of any kind, either for repairs to roads and bridges or by way of the maneuvers recommended by the Ministry of Home Affairs to speed up emergency mobilization. The maneuvers were not carried out because it was said that the prefecture was too busy to bother with them, although for the purpose of conforming to the letter of the law they were reported to Tokyo as having taken place. Nagasaki City had no new personnel either by way of regulars or auxiliaries nor was its equipment increased. Some plans had been made for training in emergency bridge repair, but these were never carried through. As to the equipment possessed by the eight companies of the prefectural construction group, that possessed by one-half of the companies was up to the standard laid down by Tokyo; the other half was not.

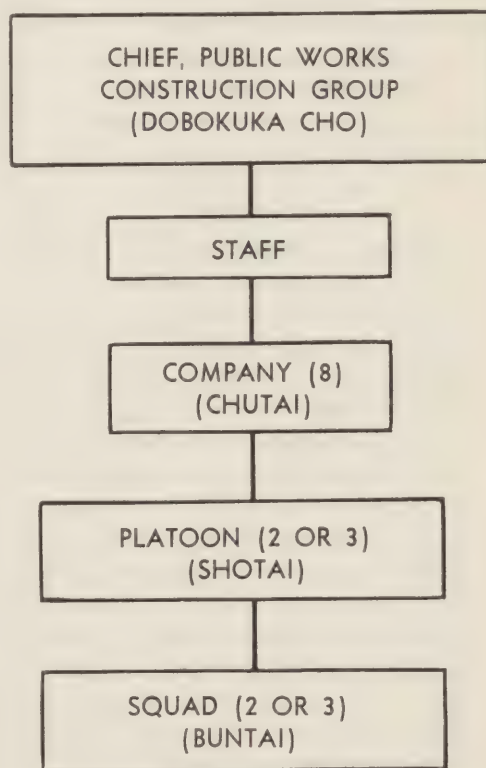
(3) *Operational Plans.* The prefecture considered itself fully capable of handling any emergencies involving roads and bridges. However, it did not consider itself responsible for clearance and repair during or within the first few hours after a raid, as it was agreed with the police authorities that auxiliary police and fire units working with the guard rescue unit should take care of immediate necessary measures. Nevertheless, in June 1944, the companies of the public works construction group were ordered to assemble at their respective company headquarters according to the following plan: when the "alert" sounded, three men were to report immediately

and the rest were to stand by in a readiness status; the "alarm" was the signal for all members to assemble; all hands remained at the headquarters throughout the "release-from-alarm" and were not disbanded until the "release-from-alert." When a long period intervened between the two latter signals, the members were permitted to go home before the "release-from-alert." In June 1945, the plan was modified so that the groups assembled upon hearing the "alert" signal. This came about because of the short period between the "alert" and the "alarm." Communications and transportation were so inadequate that this plan was put into effect so that the public works construction group could follow quickly the initial efforts of the police-operated clearance and repair personnel, and it was not regarded as changing the responsibility of the police-operated groups for taking immediate measures. As will be clear in the description of operations, police interest and authority over repair and clearance carried over beyond immediately instituted measures. The emergency repair organization (Kinku Kosaku Tai) and the rural emergency force, known as the village volunteer unit (Songiyu Tai) were summoned by the police to assist in the more permanent bridge and repair work. According to the Ministry of Home Affairs' order of October 1944, the police guard rescue unit was instructed to prepare for "debris clearance and emergency repair of facilities"; but the chief of the prefectural air-defense organization was not familiar with this order and said that the use of the police for instituting clearance was an expedient employed when the emergency arose, rather than being the result of previous planning. As in Kobe, repair materials were placed around the prefecture at important places for the purpose of easy access, but this dispersal applied only to older materials; the newer supplies were stored adjacent to a wharf in the harbor area of Nagasaki City. The planning of the city included reliance upon both the auxiliary police and fire unit and the emergency repair organization, although it had no direct authority over either. Considerable dependence was placed upon the use of the special building guards (Tokusetsu Bogodan) and it was felt by the city that this help, together with that from other prefecturally controlled units, would be sufficient for all future clearance or repair necessities.

b. *Operations.* In order to give a coherent account of what actually happened when the road

and bridge forces were called out, four incidents will be presented: two as described by the city; and two (including that of the atomic bomb) by the prefecture. Because of the diverse uses to which the several emergency organizations were put, the road and bridge operations will be given, together with those of the water works and street

ORGANIZATION EMERGENCY PUBLIC WORKS CONSTRUCTION GROUP (OKYU DOBOKU KOSAKU DAN)



PERSONNEL

Staff.....	13
Company.....	100
Platoon.....	35-50
Squad.....	10-15

car repair efforts in subparagraph "b" under paragraph 3.

3. *Repair to Important Facilities.* a. *Preparations.*

(1) *Waterworks.* As in the case of previous studies, the restoration of water service to Nagasaki City after air-raid damage was entirely a

municipal affair; the chief of the waterworks section in the city government was a member of a paper organization known as the defense headquarters. In case of air-raid damage, no auxiliary assistance by official emergency organizations as set up for all-purpose repair was anticipated by the waterworks officials. In the 26 April 1945 raid, a water main supplying one of the large Mitsubishi manufacturing plants was hit and the plant, on its own initiative, sent out a crew to assist the city water men. This worked out so successfully that a decision was made to call upon the Mitsubishi factories, of which there were four in Nagasaki, should help be needed on a subsequent occasion. This was the first and only planning for a water works emergency that might be too great for the regular maintenance personnel.

(2) *Streetcar System.* This system was privately owned and controlled in Nagasaki City and its problems were considered to be neither a prefectural nor a city responsibility. The streetcar officials believed that their own maintenance crews, plus independently hired labor, could restore service promptly in case of air-raid damage. At one time, the providing of liaison with the police for planning assistance to be given by the emergency repair organization and the auxiliary police and fire units was considered, but the idea was dropped when it was decided that those two groups would be too involved with other duties to be spared for streetcar system restoration. It was thought that the railroad might be able to help out in case of need, since it was not anticipated that the railroad might have its hands full with its own problems in case of a major raid. The streetcar authorities were even less inclined to fall back upon public help than was the electric distributing company, which had arranged with the prefecture for emergency labor when needed. Streetcar officials explained that their most urgent need was for technicians and they could not be supplied by the prefecture; nor could trained personnel be summoned from neighboring towns as was possible for the electric distributing company.

(3) *Buildings.* Repair or postraid demolition of buildings in Nagasaki, as in other cities studied, was considered to be the responsibility of the owner. There was no planning for demolition except in the firebreak program, and in the latter, the method used was that of removal piece by piece. As more fully described in the War Damage Claims section, the materials from

demolished houses were carefully saved for rebuilding purposes and in no case was the use of dynamite planned, even for emergency demolition before or after a raid. There was no central planning for building repair except in so far as large buildings were ordered to set up special building guards who might be held responsible. On the question of public and private responsibility, it is interesting to note that, whereas the special building guards were liable to call from the city, if street clearance was needed, the arrangement worked in only one direction and the city did not take it upon itself to assist the building guards, if they required help. The prefecture assumed authority over these building guards to the extent that, if a building were a menace to passersby and suitable action was not taken, the police could order them to take such action; if, for any reason, they failed to do so, the auxiliary police and fire units were ordered to accomplish the desired results. However, in that case the use of auxiliary police and fire units was not considered to be in the interest of the owner, but rather in the interest of the public.

b. *Operations.* The following incidents involving the restoration resources of the city in the prefecture are brought together as single narratives.

(1) *Incident of 29 July 1945.* On this date a 500-pound high-explosive bomb fell in the middle of an important prefectural road leading southward from Nagasaki but within the city limits, and completely blocked the thoroughfare. Members of the nearby auxiliary police and fire unit arrived on the scene within half an hour and attempted to clear the road of debris caused by houses that had been blown into the street, but they succeeded only in clearing a footpath for pedestrians because, not only did the bomb crater extend across the road, but it filled rapidly with water from a damaged water main, a problem with which the auxiliary police and fire unit was unable to cope. Several hours later the waterworks forces arrived together with the prefectural emergency public works and construction group. It was 3 days before a detour was built allowing trucks to get through and an equal period of time before the water main was repaired, and one week elapsed before the road had been fully restored.

(2) *Incident of 30 July 1945.* At 1146 on this date a high-explosive bomb hit a prefectural road in the Furuko district of the city. The assistant chief of the public works department was in his

office at the time, and within approximately 20 minutes was notified by the police on the basis of information received by them from a police station in the affected area, that a crater 39 feet (12 meters) in diameter was blocking traffic there and that a water main had been broken. The assistant chief sent a messenger to the public works branch office nearest the scene, ordering out the emergency public works construction group which arrived at 1400 with 15 workers and 1 truck. The police station sent for the members of the emergency repair organization in its district and by 1415 some 40 workers were on the scene; efforts by the auxiliary police and fire unit to shut off the water from the broken main had been unsuccessful and no work could be done to fix the road until the main had been repaired. The waterworks personnel had turned off the water by 1500 and began pumping water from the crater. Night fell before the road men had an opportunity to begin work, and the road was not made passable until the following night.

(3) *Incident of 1 August 1945.* Seven of the high-explosive bombs dropped on this date fell in such a pattern (sketch on following page) as to cause damage to streets, a bridge, and two water mains as well as to cause a complete tie-up of the city's streetcar system. The bombs were dropped at 1055 and, although the streets and bridges affected were those under city responsibility, no city personnel were on hand an hour later when the head of the prefectural public works department arrived on the scene. Since traffic could be rerouted over other streets and bridges, it was decided that no immediate repairs were necessary. Clearance of debris from the streets was done by auxiliary police and fire unit personnel and "by people who happened to be around". The city brought necessary materials and temporary repairs to the bridge were effected by the same persons who were able to make it usable for pedestrian traffic. When asked why the emergency repair organization was not called out, particularly in view of the usefulness of the bridge in effecting repairs to the break in the power line, the city public works chief stated that the men present had been sufficient. Serious repair work on the bridge was begun 2 days later, using American prisoners of war, and permanent restoration was virtually completed by 9 August when the atomic bomb was dropped. Repair of the street near the bridge was delayed by the flow of water from a broken main. The police informed the city

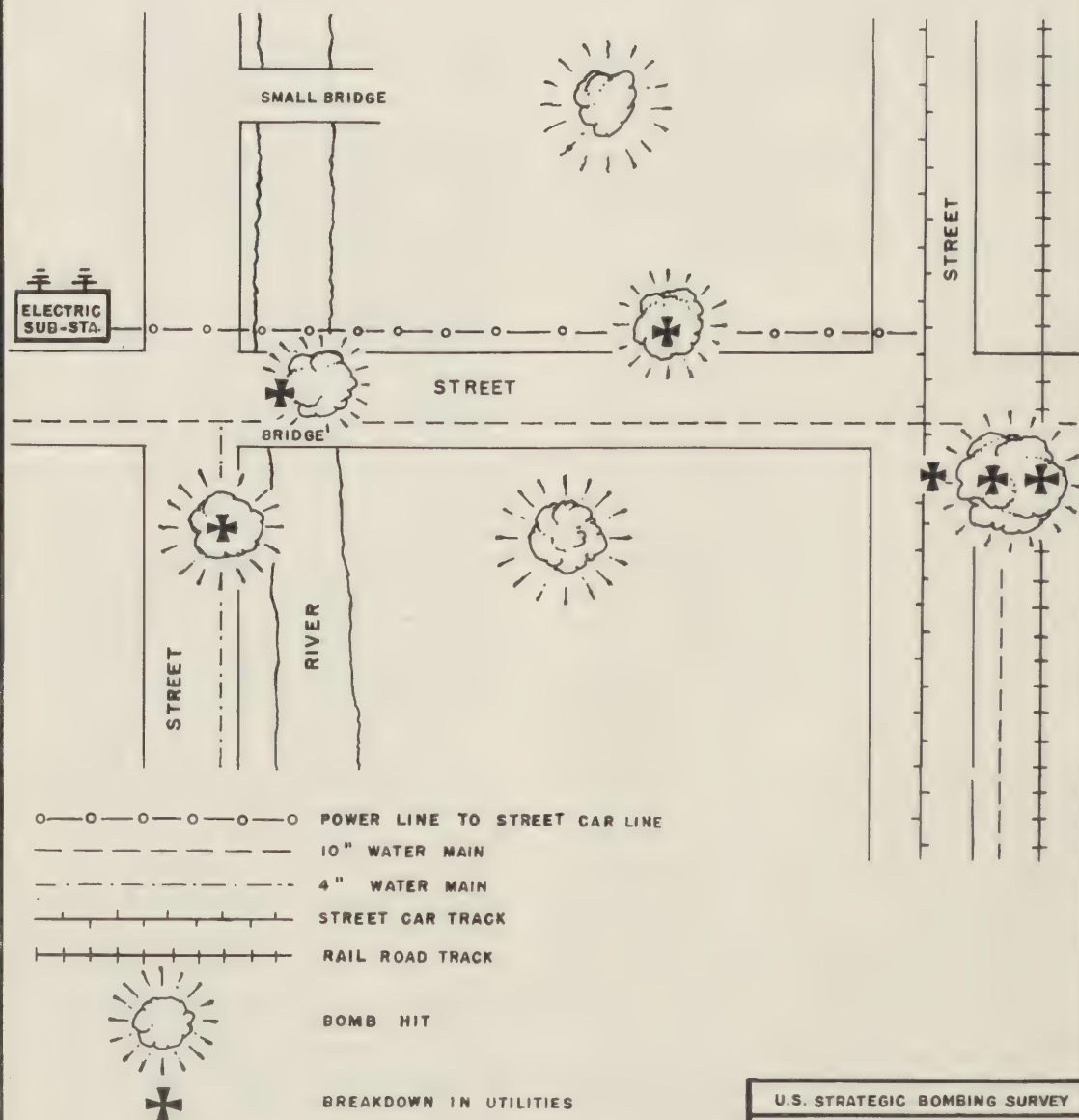
waterworks department of this break and 2 hours later the amount of damage had been determined; 6 hours later the water had been shut off. Another large water main was ruptured by the bomb that landed on the railroad tracks, and, to repair both broken mains, crews from the Mitsubishi shipbuilding plants were summoned, who effected repairs in 2 days. The chief engineer of the streetcar system, at the time the bombs exploded was in the electric substation (shown on the sketch) made an immediate survey of the damage to the power-feeder line and to the overhead trolley wires on the streetcar line. He stated that interruption of power supply by the bombs paralyzed the entire streetcar system which was out of commission for 5 days, despite the hiring of 70 laborers. Reasons for this long period of interrupted service were given as (1), the fact that only two skilled men were available for repair work, and (2), no work could be done at night because of blackout regulations. Actually work was not begun on the main line until the second day after the raid, or on the feeder line until the fifth day, but, by that time auxiliary feeder lines were in operation and the street cars were running again. The city line was fully restored just in time to be completely demolished by the atomic bomb. This same raid knocked out the Yanagawa bridge, the second largest bridge over the Yurakami river, requiring a detour of over a mile (1.6 kilometers). The city took full responsibility for its repair, and work was begun on the following day (a week later temporary repairs permitted the passage of vehicular traffic). This was a fairly important bridge and officials, when asked why auxiliary help was not summoned to shorten the period of disuse, could give no satisfactory answer.

(4) *Atomic Bomb 9 August 1945.* The city's repair facilities were completely disorganized by the atomic bomb, so that, with the single exception of shutting off water to the affected areas, no repairs were made to roads, bridges, water mains, or transportation installations by city forces. The prefecture took full responsibility for such restoration as was accomplished, delegating to the scattered city help the task of assisting with relief for victims. There were only three survivors of the 115 employees of the streetcar company, and as of 16 November 1945, no cars were running. A week after the atomic bomb exploded, the waterworks department made an effort to supply water to persons who were attempting to live in the bombed-out areas, but the leakage was so great

SKETCH SHOWING BOMB HITS (HE) AFFECTING PUBLIC INSTALLATIONS IN ONE AREA

AUGUST FIRST 1945 RAID

NAGASAKI, JAPAN.



U.S. STRATEGIC BOMBING SURVEY

CIVILIAN DEFENSE DIVISION
NAGASAKI FIELD REPORT

that the effort was abandoned. It fell, therefore, to the prefecture to institute recovery measures even in the case of those streets normally the responsibility of the city. The first job of street clearance was that of the Omotaka-Nagasaki pike, where for 8,000 feet this main artery was impassable to traffic, as were all highways northward out of the city. On the morning of the tenth, assisted by workers from the Kawanami shipbuilding works, the police guard rescue unit (Keibitai) began clearing a path 6½ feet (2 meters) wide, despite the intense heat from the smouldering fires, and by 15 August, the road had been cleared permitting two-way traffic. Three days after the bomb hit, the prefectural public works department began the work of street clearance under the over-all direction of the chief of the air-defense section. The police had called for 600 laborers from village volunteer units in neighboring towns, but only 350 were obtained; for pay, they received meals, but no cash. Of the entire public works construction group covering the Nagasaki City area only three members appeared for work, and it was stated that a week was required to locate and notify all those remaining members who had survived the atomic bombing. No trucks, only rakes and shovels, were available for clearing the streets which were filled with tile, bricks, stone, corrugated tin, machinery, plaster and stucco. Street areas affected by blast and not by fire were littered with wood. Throughout the entire bomb area, all wounded had to be carried out by stretcher since no motor vehicles were able to proceed through the cluttered streets for several days. The plan used for debris removal called for clearance of a few streets leading to the main highway, which was already in process of being cleared by the guard rescue unit; but there were frequent delays caused by the heat of smouldering fires and by calls for relief work. The debris was simply raked and shovelled off the streets and tossed on the property on either side. By 18 August, a road paralleling the important main highway to Omotaka had been cleared, and, by the twentieth, the entire job was considered complete. The streets were not materially damaged by the bomb nor were the surface and the abutments of the concrete bridges, but virtually all of the wooden bridges were totally or partially destroyed by fire. With the disorganization of the public works construction group, the emergency repair organization could have been used

for making necessary bridge repairs, but it too had dispensed and could not be summoned.

4. *Salvage.* In April 1943, there was set up in Nagasaki a metals salvage control stock-holding company under the control of the "promotion" section (Shinkoka) of the prefectural welfare department. Before the raids began the company collected metal scrap of all kinds, utilizing to a considerable extent the services of the neighborhood groups (Tonari Gumi). Amounts and location of the scrap collected by the latter were reported to the city government which notified the company; the company, in turn, collected it and made payments to the owner either directly or through the city office. The governor of the prefecture issued an order immediately after the 29 May 1945 raid on Sasebo to the effect that salvageable scrap left unmarked on property beyond 3 days became the property of the salvage company. This period was extended to 30 days in compliance with the provisions of the national salvage law of 11 July 1945, described in the Kobe report. The Nagasaki officials were under the impression that the end of the war terminated the salvage law, but in the absence of definite information, as of 16 November 1945, no salvage work had been done in the prefecture, except by private individuals, since the atomic bomb had been dropped.

5. *Comments.* The postraid clearance preparations in Nagasaki followed the same general pattern as those in other cities, reflecting the suggestions of the national government, but indicating outward conformance rather than serious acceptance. The admission of prefectural officials that reports were sent to Tokyo on training maneuvers that were never carried out was but one of several indications that the restoration officials intended to conduct air-defense preparations on the exclusive basis of their own judgment. The city was dependent on the prefecture to an extent not heretofore encountered in other localities. Unlike any of the other localities studied, the prefecture added new personnel on a volunteer, though paid, basis to its public works construction group, and subleaders of construction units appeared to have more initiative than the average run of such officials met elsewhere. Despite this, the operations in Nagasaki, both before and after the atomic bomb, suffered from poor discipline and inadequate coordination of repair forces; and were conducted on a "catch-as-catch can" basis in so many instances as to reflect

poorly on advance planning. A review of the clearance and repair experiences in connection with several preatomic bomb raids indicated much to be desired in speed and efficiency, with no noticeable improvement as time went by. The atomic bomb completely paralyzed the clearance and repair arrangements, and recovery measures were possible only by bringing in day laborers from surrounding towns on a commercial rather

than a mutual aid basis and putting them to work with picks and shovels under police supervision. Technical workers familiar with water installations and other public utility facilities were so scattered by the atomic bomb incident that services were inoperative for several weeks. Specifically, restoration measures were still in process of completion throughout the damaged area 3 months after the atomic incident.

IV. PROTECTION OF FACTORIES, UTILITIES, INSTALLATIONS AND BUILDINGS DEVOTED TO PUBLIC USE

FACTORY AIR-RAID PROTECTION

1. *Introduction.* a. Three factories were studied in the Nagasaki area, two of which were engaged in shipbuilding and the third in construction of torpedoes. One, a behemoth in the ship construction field and a member of the Mitsubishi chain, had been subjected to severe air raids, including the atomic raid; while the other shipbuilding factory, a comparatively small plant employing modern mass-production methods, was comparatively untouched by air raids. The third plant, which was also a member of the Mitsubishi Heavy Industries chain, was interesting due to the extensive underground tunnels which were used to house heavy machine tools and the torpedo assembly department. The scope of this report is to show the basic methods laid down for air-raid protection, to make an analysis of the defenses in the shipbuilding plants, and to show the adjustments and changes of methods, if any, which were brought about by successive raids. Detailed plant protection of the Mitsubishi Torpedo Works was not undertaken, but an examination was made of the underground dispersal plant of this factory in the nearby hills, in order to determine how well it stood up against the atomic bomb, as well as what the general procedures were in Mitsubishi's efforts to go underground with their production.

b. All plants were privately owned and government controlled; all received instructions from the prefectural government; yet all were also under the control of the Munitions Ministry for final guidance in air-raid protection matters. Management in each of the shipbuilding plants was held directly responsible for air-raid protection, but interest in the two plants under discussion varied tremendously.

2. *Mitsubishi Shipbuilding Plant* was a massive concern, consisting of 452 buildings sprawled over an area of 4,734,000 square feet, involving over 14 separate plants which included a heavy shipyard, midget submarine plant, diesel engine

plant, ship repair docks, turbine factory, oxygen plant, ship finishing plant and several other smaller incidental operations. All in all, the Mitsubishi Shipbuilding Plant was a highly complex organization involving varied operations which necessitated an equally complicated and cumbersome air-raid protection organization.

a. *Organization.* The Mitsubishi air-defense organization was composed of a headquarters unit and nine branches, corresponding to the nine branches of the factory.

(1) The headquarters was composed of light control, gas defense, first-aid, transportation, general affairs, guard, fire, and repair sections.

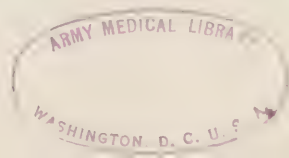
(2) Each of the branches (Shibu) was divided into subunits (Bundan) and each of the subunits was further divided into squads (Han).

(3) There were five squads to a subunit which were: general affairs, guard, fire, first-aid, and repair.

b. *Functions of Squads.* (1) *Guard Squad.* This squad was charged with fire and aircraft spotting, giving alarm, preserving order, and relieving victims.

(2) *Fire-Fighting Squad.* Mitsubishi maintained a full-time fire brigade, composed of 70 men who were poorly trained, but who did have a small amount of modern equipment. ("Protective Equipment".) This permanent brigade was reinforced by 42 volunteer units of approximately 75 men each. Training of both groups was inadequate and sporadic, and auxiliary equipment assigned for their use was most inadequate for the size of the plant.

(3) *First-Aid Squad.* This plant had a fairly modern hospital whose personnel, equipment, and facilities were supplemented by the first-aid squads. The staff consisted of 22 doctors, 13 pharmacists, 40 registered nurses, and 11 student nurses who operated the hospital containing 100 beds, five consultation offices, 2 operating rooms, and an X-ray laboratory. Supporting the hos-



pital unit were 42 first-aid squads, each consisting of approximately 60 persons. These auxiliary groups maintained 3 casualty stations and 1,200 litter stations, all of which were adequately equipped for their purposes.

(4) *Repair Squads.* The permanent plant maintenance department effected all general repairs and, when necessary, it was assisted by members of the repair squads. These squads were 42 in number and contained over 75 persons in each. Repair actually resolved itself into a matter of clearance owing to the fact that no comprehensive repairs could be made because of material shortage.

(5) *General Affairs Squads.* The general affairs squads kept records and did other general administrative duties. They acted as a liaison arm, forming a part of the air-raid-warning net by relaying alarms and, in addition, took care of the feeding of personnel during the night shift when the regular feeding department was inoperative.

c. *Protective Equipment.* Mitsubishi had 4 modern gasoline-driven fire pumps of 450 g.p.m. capacity; 14 fixed gasoline-driven pumps of 450 g.p.m.; 15 fixed electrically-driven pumps of 1,000 g.p.m.; six manually-drawn gasoline-driven pumps, 450 g.p.m.; 5 fireboats, 450 g.p.m.; and a fresh water system containing over 400 hydrants (Reference Item 11); and 3 salt water systems of great capacity ("Water Supply"). In addition, there were 1,400 portable fire extinguishers, 180 gas coats, 10,000 gas masks, 5,000 helmets, and 5,000 sand boxes. At first glance these would seem to constitute a rather imposing array of equipment, and it was the largest seen in any plant investigated, but, when one stops to realize that this plant had over 450 buildings, covering an area of 4,734,000 square feet, it immediately becomes apparent that the equipment was almost meager in comparison with normal American practice, especially in view of the fact that the factory area was considerably congested and none of it was protected by automatic sprinkler systems. This fire pumping equipment had in connection with it 40,000 feet of 2½ inch hose and 20,000 feet of 1½-inch hose, but, at the time of inspection, most of it had deteriorated badly and not over 1,000 feet was immediately available in case of fire; pumping equipment was not in operating condition; and the hand extinguishers were almost all inactive and useless.

d. *Water Supply.* Mitsubishi's water was supplied from Nagasaki City through a 6-inch main at a pressure of 35 pounds per square inch. In addition to that, the plant had three auxiliary systems which used salt water. The latter systems had three pumps delivering an aggregate of 84,000 gallons per hour and the storage tanks contained approximately 900,000 gallons of static water, 700,000 of which were lost in the raid of 1 August 1945. In addition to the static supply, there were 1,500 small tanks of approximately 12 gallons each, scattered throughout the plant. In the major raid of 1 August 1945, city water pressure went to zero, nearby salt-water systems were knocked out, and fires burned unchecked.

e. *Air-Raid-Warning System.* Mitsubishi's air-raid warnings were received initially by telephone from the Nagasaki Garrison and the Nagasaki switchboard, by radio, and by city sirens. In each case the messages were picked up by the control center and relayed to the several plants by telephone, loud speakers, sirens, bell ringers, and criers.

f. *Control Center.* The control center was completely equipped, adequately staffed, and located in the basement of the main administration building. The normal complement was 10, but it was increased to 20 during air raids. Equipment included switchboard, public address system, and gas masks.

g. *Dispersal.* Dispersal was by far the most adequately carried out method of air-raid protection. Mitsubishi had plans underway to put their whole submarine plant underground and the rest of their small operations in school buildings and outlying factories. An excellent example of Mitsubishi's dispersal to underground tunnels was its torpedo plant discussed in paragraph 4.

h. *Protective Lighting and Concealment.* Mitsubishi had an efficient blackout program in operation until the material began to wear out and could not be replaced, and then it became necessary to turn out the lights by means of a master switch which was located near the main transformer, and many man-hours were lost during the latter part of the war because of lack of light during protracted blackouts. Only a small amount of camouflage was attempted, and that was in connection with a few storage tanks in an outlying area.

(i) Mitsubishi's plans were well laid and personnel was well organized; equipment was as good as could be secured with the supply situa-

tion as it was. When inadequate equipment came up against raids of saturation character, it failed, became disorganized, and was destroyed; and personnel, confronted by a greater problem with less equipment than ever, turned and fled. They were fighting a losing battle against overwhelming bombing and were whipped, even before the advent of the atomic bomb.

3. *Kawanami* was a small, unified plant, well organized and dispersed in such a fashion as to offer the minimum vulnerability consistent with maximum ease of production of their 1,500-ton freighters. (Exhibit *D* and Reference Item 9.)

a. *Organization.* The head of the air-raid protection organization was the general manager of the company, assisted by the general affairs department which acted as an administrative staff. This staff included only 41 persons and was divided into general affairs, food, ration, and messenger sections.

b. The air-raid-defense organization was broken down directly into six operating units which were: guard squad, fire unit, reserve, two repair units, and a medical unit.

(1) *The Guard Squad* acted only as fire spotters and stayed in the pillboxes built for that purpose. These men were given no special training.

(2) *Fire Unit.* Kawanami's fire-fighting section was very poor. The only gasoline pumps which were available were borrowed and two of these four pumpers were not in operating condition. Training was poor. Only three classes had been held during the war, and they were conducted to give instructions in the use of such crude equipment as beaters, mats, shovels, ladders, and buckets. Kawanami could not have fought a fire successfully, and the manager of the plant knew it and acted accordingly. He ordered all of his personnel to take to cover and not to worry about exposing themselves in a futile struggle.

(3) *Medical Unit.* Kawanami's medical unit was very small, but for the size of the plant was rather well equipped and trained. Their small hospital contained 10 beds, 2 consultation rooms, 1 operating room, and was staffed by 2 doctors, 18 registered nurses and 20 corpsmen, all of whom were well trained in their duties. There were no casualty stations in the plant, but the air-raid shelter was fully equipped, even for major surgery, and also had an X-ray unit available. This hospital was assisted by 5 units of 12

men each who acted as stretcher bearers, but who did not know how to administer first aid.

(4) *Repair Squads.* Kawanami had no formal plant maintenance department as such, and what repairs were done were scheduled to be carried out by general workmen who were organized into 2 units of 40 and 60 men, respectively.

c. *Protective Equipment.* This plant did not have any power fire pumps in connection with the plant proper, but it was able to borrow two 450 g.p.m. and two 120 g.p.m. units from the local auxiliary police and fire unit (Keibodan). Plant-owned equipment included 6 hand pumps, 120 g.p.m.; approximately 1,800 feet of 2-inch hose; 900 feet of 2½-inch hose; 40 beaters; 100 grass mats; 100 sand boxes; 60 hooks; 10 ladders; 500 shovels; and 500 canvas buckets. Obviously the equipment would have been of little value, even in the case of a normal incendiary raid; the manager realized that fact and the policy in the event of attack was to take shelter and let the plant burn.

d. *Water Supply.* Kawanami had one 36,000-gallon storage reservoir, with a head of 75 feet. The pipe which carried it to the plant was so clogged with debris that it was unable to be used for plant protection. Static water supply included two small salt water reservoirs in the plant proper, but pumps were too small to make much use of them.

e. *Air-Raid-Warning System.* The initial warning came from the Nagasaki Garrison and switchboard, as well as the local radio. Interior alarm was handled by bell ringing and the raising of a white flag in the case of an "alert" and a red flag in the case of an "alarm."

f. *Control Center.* The control center was in a cave in the side of a nearby hill. It was equipped with telephone, radio, and housed the entire headquarters staff during a raid. Construction of the center was faulty, however, inasmuch as water seepage in the month of September 1945, caused it to cave in from its own weight.

g. *Dispersal.* A great percentage of machine tools was dispersed to tunnels on an island in Nagasaki Bay, and what equipment could not be dispersed was either heavily baffled or buried beneath the floor level. Had the war lasted another 6 months, all machines and a great deal of the sub-assembly work would have been underground.

h. *Protective Lighting and Concealment.* This plant used no camouflage, controlled the lighting

from an interior switch, and had certain office buildings protected by black-out curtains.

i. *Operation.* Kawanami was never the subject of an attack, so that their air-raid system had never been tested. However, what they did have would have been of little value. The manager stated that their equipment was so inadequate that the policy was to go to the shelter and not to bother about fires. He further stated and emphasized on several occasions that the air-raid protection plans which they had were only "paper plans," made in conformance with governmental directives.

4. *Mitsubishi Heavy Torpedo Works.* (Exhibit D) The underground dispersal plant of this factory was in the nearby hills some 1,000 yards from the main factory building. Six specially constructed tunnels housed some of the heavy machine tool operations of the torpedo assembly department, and proved to be very effective against damage caused by the atomic bomb explosion. From the appearance of the machine tools and the general working conditions found within the tunnels, this plant was in the process of getting organized and established following the completion date of February 1945, and had not actually assumed its full production capacity by the time the war terminated. However, this operation was a typical example of the Japanese plan for dispersal of war industries, which was begun at a date too late in the war to be effective against crippling raids.

a. *Underground Dispersal.* Six large tunnels were bored in the side of a mountain in which it was obviously intended to house all of the power machine tool operations of the plant. Construction of the tunnel began during August 1944; about 50 percent of the program was fully completed and ready for occupancy by February 1945. According to the spacing of the machine operations in the underground tunnel, it was evident that facilities were available to employ at least 2,500 operators of lathes, drill presses, reamers, finishers, punches, diemaking machines, machine threading tools, buffers, and other finishing devices.

b. *Construction.* Six parallel tunnels were bored through a mountain foothill, the base of which was 1,115 feet, with one lateral tunnel connecting all six, bored midway and at right angles to the parallel tunnels. The borings, approximately 9 feet by 14 feet, were drilled through solid rock, and finished by reinforced concrete.

Entrances were protected by heavy wooden doors and some attempt was made to conceal them by use of camouflage paint. There were no heating devices in the tunnel, and only natural ventilation was provided.

c. *Power and Water Supply.* Power for the operation of the plant was secured from Nagasaki City and water was obtained from a reservoir located at the top of a nearby mountain.

d. *Manufacturing Processes.* All steel, bronze and aluminum alloy castings were supplied to this operation, from which point such finished products as pistons, connecting rods, wrist pins, valve tappets, and many small torpedo assembly parts were machined and finished.

5. *Comments.* a. *Mitsubishi Ship Building* was a tremendous concern with unlimited resources and engineering personnel who did their best with what equipment they could muster. They learned from each successive raid, altered their plans accordingly, and failed in the end because of the magnitude of the attacks and incident damage confronting them. Their problems resolved itself into dispersal, fire protection, and shelters. Dispersal and shelters were handled admirably, but fire protection became an insurmountable obstacle. As the raids grew in frequency and intensity, damage mounted. Original facilities were taxed and destroyed, and, as the shortage of equipment became progressively more acute, it was eventually evident to the plant manager, even before the advent of the atomic bomb that plant personnel must give up, and an order was issued that in the event of air raid, all personnel would take shelter, wait until the raid was over, and then try to hold the damage to a minimum.

b. *Kawanami's* attitude in the beginning was approximately the same as Mitsubishi's attitude after the latter tried and failed. Kawanami did what they could. They removed the inflammable roof of their main factory, tore down several buildings for firebreaks and constructed tremendous shelters in tunnels, costing over 600,000 yen. Their fire-fighting equipment, however, was so ineffective that even the managerial personnel knew that an attempt to use it would be futile. "Paper plans" were made to conform with governmental directives, but the general order was to take to shelter and make no attempt to fight fire.

c. *The Atomic Bomb.* As previously stated, insofar as the Mitsubishi Ship Building was concerned, the plant protection organization had

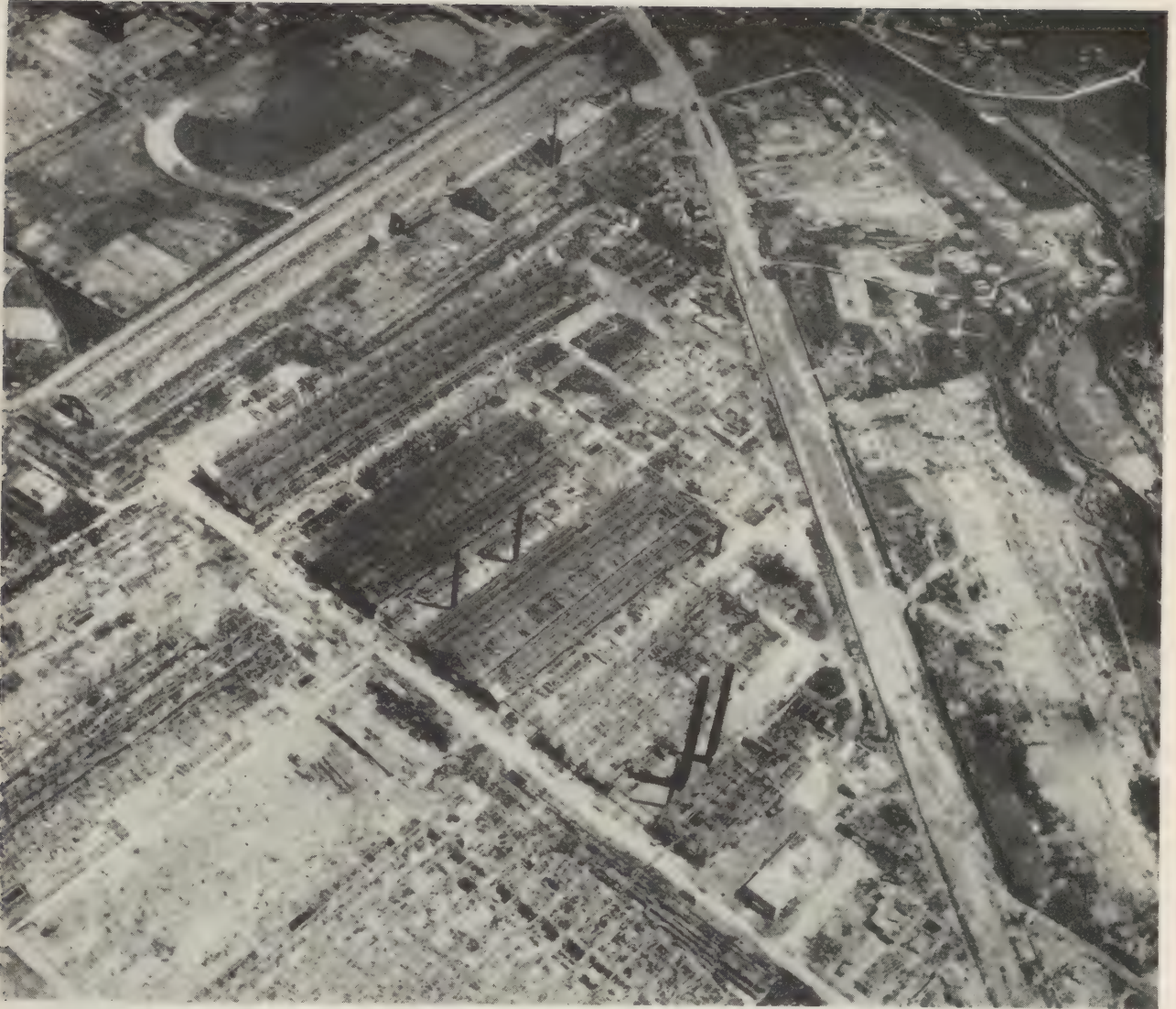


Photo 21. 5000 feet from GZ. Mitsubishi Torpedo Works. Area view looking northeast.

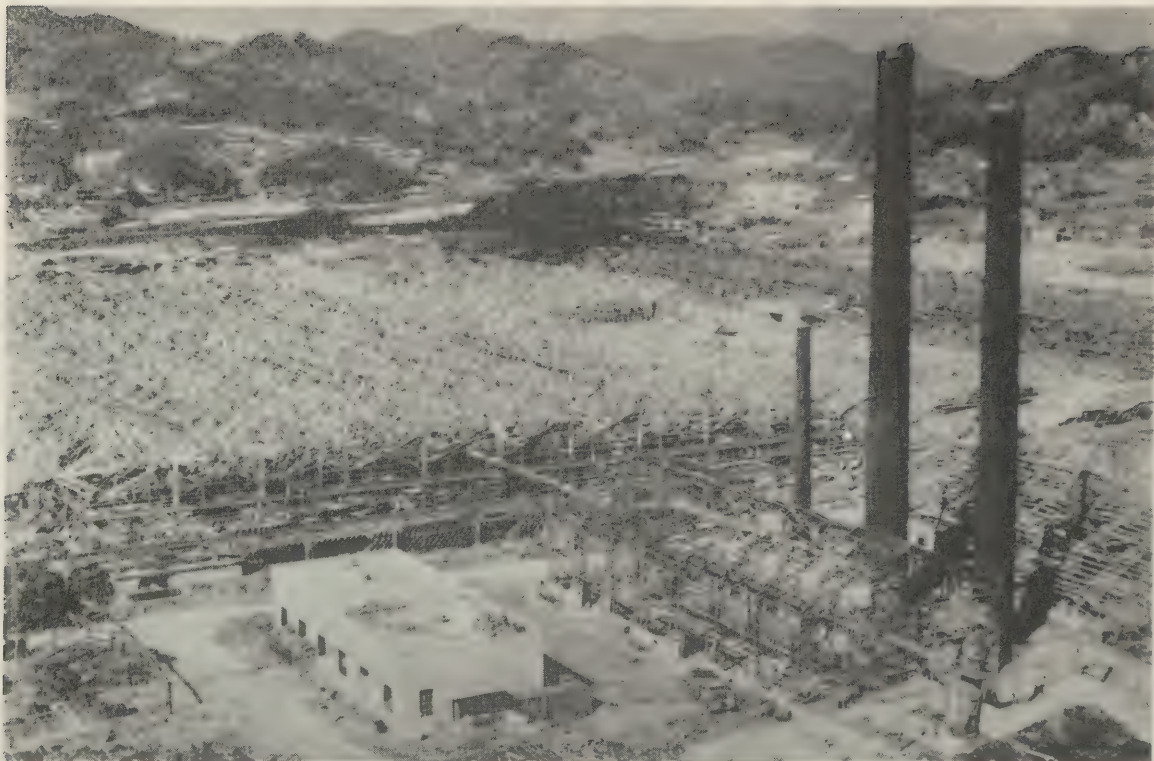


Photo 22. 4500 feet from GZ. Aerial view looking northwest. Bldg 11 (boiler house) in foreground.



Photo 23. 4500 feet from GZ. Aerial view east.

already been proved, ineffectual even before the atomic bombing. What few operations they did have going were stopped when the plant personnel were either killed or made homeless. In the case of Kawanami, although it was never struck by normal raids and no damage was done by the atomic bomb, strategic bombing so crippled the transportation facilities that their plant had almost stopped before the atomic bombing. When the atomic bomb fell, however, many of the plant workers who were not killed were made homeless, and the lack of shelter had such a profound effect upon plant personnel that it provided the finishing touch which stopped the plant. In the case of Mitsubishi Torpedo Works, the following is of interest. At the time of the explosion of the atomic bomb at 1102 hours on 9 August 1945, those portions of the underground operations completed and installed with machine tools were in complete operation. It is reliably reported that no lives were lost nor injuries sustained by em-

ployees, the only damage incurred was at the tunnel entrances where three of the six doors were partially pushed in and shattered by the impact of the bomb blast. These tunnel shelters indeed offered adequate, and complete protection to both personnel and machine tool operations against the terrific blast effect of the atomic bomb, and that is particularly significant in view of the proximity of this underground plant to the zero point of the atomic bomb explosion. Air-raid protection organizations in Nagasaki had been so thoroughly battered, and equipment so completely depleted that by the time the atomic bomb hit, they had ceased to function as units, and since fire-fighting equipment had always been practically nonexistent, orders were in effect to abandon the plant and stress individual protection. Not only were these units unable to cope with a small raid, had it come, but their fire-fighting equipment was so meager as to preclude satisfactory operation against even incipient fires.

RAILROAD AIR-RAID PROTECTION

1. *Introduction.* The Nagasaki district was one of six district subdivisions of the Moji railway bureau. The district included two principal branches and extended from Hizen Oura and Arita to a circuit of the southeastern peninsula and Oshimabara; and the main line ran southward to the terminal at Nagasaki. Within this section lay Haike, the junction with the important Sasebo line, and the lower branch served an important industrial and shipping area.

2. *Organization* for air-raid protection and for maintenance was not a district responsibility but was controlled at Moji and decentralized to sections and individual installations. The Nagasaki office was organized for the protection of the city installations only. The railroad line entered the city through a narrow valley and the 10 main installations were concentrated in the heart of the city with the station and switchyards located on the waterfront that formed the head of the harbor. Each of the following installations had a separately organized air-raid-protection organization (Bogo Gundan): the main station and switchyard; the upper switch and freight yards; the locomotive shop; passenger and freight car shop; road maintenance shop; electric power plant; and the mechanical construction shop.

a. The organization for the air-raid protection of each of the above was similar to that of the station and yards, the 210 employees of which were all enrolled and trained as members and assigned as follows:

- (1) Staff, variable.
- (2) Lookout section (Kanshi Han), 6.
- (3) Guard section (Keikei Han), 20.
- (4) Communications section (Renraku Han), 24.
- (5) Fire-fighting section (Shobo Han), 40.
- (6) First-aid squad (Kyukyu Han), 18.
- (7) Rescue squad (Kyugo Han), 40.
- (8) Food supply squad (Haikyu Han), 18.
- (9) The balance were organized as reserves and replacements. This organization indicated that local organizations were allowed to adopt their own idea of a plan and that regulations from higher echelons were used only as a guide.

b. Air-raid warning was received from two sources: from the bureau office at Moji by direct wire, and from the prefectural air-defense headquarters. The station master maintained a control center and relayed the warning to the other railroad installations. The first public audible signal, the "alert," was ignored by all except the guard section which mobilized and then cleared

the station of all but employees. The "raid" was the signal for immediate evacuation to shelters.

c. The fire-fighting squad was inadequately equipped with but one portable gasoline pumper, one hand pump and buckets. Static water tanks were scattered liberally throughout the station and area. The prefectural fire department was called in case of serious fire.

d. Emergency medical service for all of the local installations was handled at the station dispensary where one doctor, six nurses and two pharmacists were regularly stationed. In emergencies, the first-aid squad reported to the first-aid station and the rescue squad delivered wounded to them for treatment and evacuation.

e. The supply section provided food and drink to all workers during early postraid activities.

f. Emergency repair was accomplished by the local maintenance section for minor damage, but for greater damage and track repair the larger section at Nagayo, 15 miles northward, was responsible. Light repair trains were stationed there in readiness and heavy repair trains were kept at Moji and Kogura.

g. *Shelters* constructed by the railroad were of 20 person capacity, half below the surface, with a 10-inch concrete arch roof and 8-inch walls, banked and covered with gravel and earth. Eight of them in the railroad yard near the station accommodated all station employees on each shift. Public shelters were nearby for waiting passengers, and caves in the side of the mountain were but 600 yards away.

3. *Comments on Operation.* a. *First Raids.* Railroad installations suffered from two high-explosive raids: 26 April and 1 August 1945. The first accomplished little damage and was easily handled locally without disturbing train schedules. The second raid wrecked one warehouse, destroyed a second by fire and blew up five sections of main line track. Of 600 railroad em-

ployees on duty in all installations, 78 were killed, 19 missing, 36 severely wounded and evacuated to city hospitals, and 119 treated for light wounds and burns. A repair train and 400 workers were brought in from Nagayo and Hizenyamaguchi. Communications were mended in 12 hours and the track repairs allowed trains to resume schedule in two days.

b. *Atomic Bomb Attack.* The atomic bomb attack of 9 August 1945 was sustained while under "alert." The station was emptied of all but employees. The bomb, exploding at a distance of 1½ miles, flattened the station and its collapse started a fire which completely consumed the wreckage. No attempt was made to extinguish this blaze, but the fire squad concentrated on preventing its spread to warehouses and other buildings. No help was received from the city nor any outside source and the self-protection units of the railroad installations confined the flames to the large station building. One hundred and eighty-eight employees were killed in their homes, but oddly enough, there were no fatalities at the railroad center. Through the postraid period the employees stayed on the job and slept in shelters and nearby caves. The Moji-Kogura heavy repair trains and 100 workers and the small repair trains and 400 men from Nagayo and Omura came in. It required 84 hours to resume train service, which was first used for evacuation of injured and for mobilization of emergency community assistance. Response and performance of railroad air-raid-protection personnel were unquestionably superior to other parallel services in the area. Further, their shelters were better constructed than the public ones throughout the city. There was a lull in traffic at the time of the atomic explosion and the station was not crowded, but had it occurred during a period of peak traffic and under an "alarm" status, the patrons would have received adequate protection from the shelter measures that were in effect.

NATIONAL COMMUNICATIONS AIR-RAID PROTECTION

1. *Introduction.* National communications for Kyushu, the southern island of Japan, were directed through Kumamoto, one of the seven district headquarters for the control of all communications. This district bureau (Taishin Kyoku) controlled and directed all operations including air-raid protection for the telephone, telegraph

and postal services. Nagasaki was one of the most remote terminals of the system.

2. *Organization.* a. Organization for air-raid protection was decentralized to individual postal, telephone and telegraph buildings and installations. Each was required to organize, train and maintain a self-protection unit (Bogodan), pre-

viously described in detail in the Osaka and the Kobe target reports. The organizations in Nagasaki were identical with them in principal and form.

b. A repair section was maintained in Nagasaki by the Kumamoto bureau, consisting of an average strength of 150 technicians, linemen and laborers. The principal unit for emergency repair was located in Omura.

3. *Operations.* a. The air-raid attacks on this city up to 9 August 1945 were made mostly with small high-explosive bombs. The damage to installations was light compared with that inflicted by the incendiary raids at other places (i.e., Kobe). The lines for the wired services followed the railroad tracks along their winding courses between the irregular mountains and were mostly overhead bare wires, vulnerable to damage but readily repaired. Except for the atomic attack, the incendiary raid on the early morning of 11 August 1944 inflicted the most damage to local subscriber equipment, and that was confined to residential and industrial communications on the west side of the city, while vital facilities were virtually unharmed. The 1 August 1945 raid destroyed 20 per cent of the facilities of the Daikoku telegraph building, disrupted the railroad communications and the outside lines of the long-distance telephone service. Under the direction of the Kumamoto communications bureau, a crew of 300 men was sent in from Omura and repairs were still in progress at the time of the atomic raid.

b. On 9 August the atomic explosion occurred directly over the narrow upper valley of the town through which passed all of the wires and cables to the north. For a distance of approximately 4 miles all of these facilities were destroyed. The damage from both primary and secondary fires completed the disruption of all the services. Technicians, laborers, and material were sent in from

as far as Moji, Fukuoka and Sasebo. Emergency lines were established to Omura and essential official communications were dispatched by radio telegraph. A temporary local telephone network was restored for police and governmental agencies, but no private service was available 90 days after the disaster. No postal service was operative for 18 days, except a limited courier service. After 18 days a class III service with no deliveries was then restored.

c. *Comments.* The topographical isolation of this area and the predominance of above-surface lines made its communications highly vulnerable. Creditable maintenance, however, was performed under the impact of ordinary attack. Postwar floods, added to atomic damage, extended the isolation, except for radio communication, to a period of 3 months after the end of the war. The skilled personnel for maintenance was available and well organized. Emergency wired communications could have been restored quickly had the wire and instruments been available. The failure to provide reserve stocks was a serious fault of the defense planning. The subscriber lines were destroyed with the homes and places of business, principally by fire. There was no evidence that communications were more susceptible to damage by the atomic attack than to other forms of high-explosive bombs. One of the principal weaknesses observed was the inadequate protection of the vital communication facilities. The types of buildings that housed these facilities were highly vulnerable to high-explosive and incendiary attack to which Nagasaki was repeatedly subjected as evidenced by the total destruction by blast and resulting fire in the raid of 1 August 1945. No alternate facilities were provided to meet such an emergency. Further, the land wires were all canalized through a narrow valley leading out of the city area.

HARBOR AIR-RAID PROTECTION AND PORT SECURITY

1. *Introduction.* a. Nagasaki, an ancient fishing port, was opened in 1859 as a treaty port, and final regulations as such were put into force on 1 November 1898. Its trade gradually climbed to the peacetime total of \$27,255,000 in imports and exports for the year 1937, and to the wartime trade in 1944, of \$41,476,000, with imports always about double the amount of exports. The princi-

pal exports given in order of monetary value were: canned sardines, coal, machinery, lily roots, dried fish, sugar, and potatoes. Its principal imports in order of value were: crude oil, iron plates, metal and wood work, machinery, pressed soya beans (for fertilizer), miscellaneous machinery, sulphuric acid, lumber, pig iron, and red beans. Its trade with other countries in order of amount

was as follows: United States, Dutch Indies, British Indies, China, Germany, Kwantang District, Manchuria and England.

b. The harbor was elongated and irregular in shape, divided by nature into four sections, with the first section at the head of the harbor and in the center of the city of Nagasaki. The other three sections extended out toward the sea. These sections had anchorage areas as follows: first section, seven-tenths square mile; the second section, four-tenths square mile; the third section, one and eighteen hundredths square miles; a total of two and twenty-eight hundredths square miles. General shipping was handled on four large wharves, the sizes of which were: Dejimachi wharf, 1,380 feet; Ohato wharf, 1,848 feet; fish unloading wharf, 693 feet; and Umegashai wharf, 1,520 feet; a total of 5,441 feet. In addition there were the many docks or private shipping and manufacturing concerns and a multitude of smaller wharves for coastwise shipping.

c. The main station, terminal and the freight yards of the national railroad were located at the head of the harbor in the center of the city. One of the largest of the Mitsubishi ship building installations with huge shipways and drydocks was established on the west shore of the harbor, and the entire shore line (except where precipitous mountain slopes rose directly from the water's edge) was a concentration of war production factories, oil and fuel storage yards and food products industries.

2. *Organization for Air-Raid Protection.* In 1938 the governor of the prefecture established an air-raid defense headquarters which, in turn, issued regulations concerning air-raid-defense measures for the harbor. These plans were merely a redraft of the policies established by the national government, and were issued to the several heads of the departments concerned with harbor affairs. They prescribed the utilization of available personnel: the established force of the police department, fire department, repair and maintenance section, harbor engineers, and customs department. The chief executives of these agencies displayed indifference and laxity and no coordination of plans. In 1942, the governor reorganized his air-defense headquarters to include a section of directors to specialize in harbor defense matters. This section was termed the harbor air-defense assembly (Sogo Boku Kyogikai), and it consisted of a chief appointed by the governor, and the following directors: the chief

of police, the chief of the water police, the chief of the fire department, the director of the maritime bureau, the harbor master, the mayor of the city, the harbor engineer, and the local commanders of the army and the navy. They were requested to meet in frequent conferences to coordinate all of the plans for harbor protection. The self-protection forces of private industries located in the harbor area were supervised separately by the chief of this section and plans for mutual assistance were coordinated by him. Through the mayor of the city, a special organization of the auxiliary police and fire units was reorganized and known as the auxiliary water police (Suizo Keibodan). This planning and operating assembly developed a coordinated organization for the emergency protection of all harbor facilities, which will be included in detailed descriptions in the following subparagraphs. The locations of defense installations in relation to harbor facilities are shown on a Japanese chart with English translation of key (Reference Item 12).

a. *Water Police.* This group of prefectural police was strictly "marine police" and its jurisdiction extended over the entire surface of the water to include shore line installations such as docks, wharves, ferry houses, small warehouses and installations best described as "touching the water". Other than those, the water police had no landward jurisdiction. The forces consisted of a chief, 3 assistant chiefs, and 60 men, organized into a day shift of 43 and a night shift of 17, but those off duty were always subject to emergency call. Their equipment consisted mainly of three combination fire and patrol boats, one large and two small. The larger one, a 25-ton craft, was equipped with a 500-gallon per minute gasoline pump. The two smaller ones of 5 tons, were each equipped with a 350-gallon per minute pump. The principal duties of the water police were the supervision of the water area, fire fighting and fire prevention, enforcement of traffic and light regulations, protection of docks and shore line. In emergencies they assumed the responsibilities of incident control, assigned special emergency duty to auxiliary water police, supervised rescue, first aid, evacuation, and emergency salvage.

b. *Maritime Bureau.* The director of this agency through his harbor master controlled all matters concerning shipping, the movement of larger vessels in the harbor, harbor regulations, marine lighting regulations, and the dispersal of

vessels throughout the harbor. He controlled the customs department, the quarantine docks, and all government warehouses. He was responsible for the organization of self-protection in each of the above government installations, including that of ships at dock or at anchor in the harbor. Unlike the Kobe director of the maritime bureau he was not responsible for the protection of warehouse installations that were privately or municipally owned. With customs patrol personnel he assisted the water police in the enforcement of harbor regulations. His was the primary responsibility for clearance of the channel in case of air-raid warning and the removal of ships containing dangerous cargo to safety areas.

c. *The Air-Defense General Headquarters* of the prefectural government was responsible for the supervision of factory air-raid protection in the important war industries, both privately and government owned in the harbor area. In the larger industries, inspections were made by this headquarters, but inspections of smaller industries were delegated to the regular police district chiefs.

d. *The City of Nagasaki.* The mayor's office was responsible for the organization and self-protection of municipal warehouses and other municipally owned installations; for all matters of welfare, emergency relief, evacuation, promotion of fire prevention and establishment of fire-breaks involving the razing of privately owned property. He was further responsible for the organization, training, operations, supply and maintenance of a specialized organization covered in the paragraph immediately following.

e. *The Auxiliary Water Police and Fire Unit (Suijo Keibodan).*

(1) This organization formed the real backbone of the organization for emergency protection of the harbor and the harbor area. It was recruited, organized, and trained by the chief of the Nagasaki auxiliary police and fire units, assisted by the chief of the water police. Its organization followed a pattern specified by the harbor air-defense council. It consisted of a leader, his staff, and 300 selected men, organized into 5 subunits known as "Bundan"; each subunit in turn was divided into 2 specialized sections: a fire-fighting section (Shobobu) of 20 persons and an air-defense section (Keigobu) of 39 which in turn was broken down into 3 squads, each of 12 men and a leader as follows: the lookouts and observ-

ers (Bokuhan), rescue and first aid (Kyugohan) and the guard and police squad, (Keibehan).

(2) The harbor itself was divided into five protection districts and one of the auxiliary water police subunits was assigned to each. A headquarters was established for the entire organization with telephone communications to air-defense general headquarters, water police headquarters, city hall and to each of its lower echelons. A headquarters and assembly point was established for each of the five subgroups at a point convenient for the control of the section of the harbor assigned to it for protection.

(3) Each subunit had assigned to it an auxiliary fire and patrol boat. Each boat was privately owned and operated commercially in the harbor district to which it was assigned. Most of these boats were of approximately 10 to 15 tons; four of them had gasoline-driven pumps, three of the pumps each having a capacity of 350 g. p. m., while the fourth was of 100 g. p. m. capacity. The fifth boat had only a large hand pump. Additional equipment consisted of marine first-aid and rescue equipment, ropes, gear, and fire-fighting chemicals. Attached to each boat was a small organized fleet of small boats to be used for rescue and evacuation of the wounded. The training of these subgroups was the responsibility of the mayor and was carried out by the leader of the auxiliary water police and fire unit. Each subleader was required to attend the prefectural air-defense school for a period of two days and the training of the subunits was conducted by them, with the help of the water police, for half-day periods, 6 weeks apart.

(4) A first-aid station was established in each district in shrines or other available buildings conveniently located to the water's edge and to landward avenues of transportation.

f. *Self-Protection (Bogo).* Self-protection units were organized in each of the enterprises and installations on the water's edge. They were organized among the employees and followed a common general pattern, that is, they consisted of a specialized group, divided into specialists' squads for fire fighting, rescue, first aid, guarding and control, and for communications; the balance of the employees were organized as a reserve force. The responsibility for these self-protection units was the individual responsibility of ownership or management.

g. *Maritime Bureau.* In matters of air-raid protection of the harbor, the Nagasaki director

had less responsibility than did those in Osaka and Kobe. He was responsible only for the control of shipping and for the self-protection of government owned facilities.

h. *Railroad Bureau.* The government railroad bureau, although adjacent to the harbor, was independently organized for its own protection, but its representative coordinated plans for emergency mobilization and evacuation.

3. *Operations.* The study of air-raid data given in the introduction of this target report shows a pattern of attack in which four of the five regular bombing attacks were partially directed at the harbor; and the atomic bomb explosion from which the harbor suffered. A summary of operations and performance under raid conditions is given below:

a. *Damage by Raids.* In four raids, 26 April, 29 July, 31 July, and 1 August 1945, 18 ships were sunk in the harbor, totaling 17,178 tons. In the same raids 18 ships with an aggregate tonnage of 24,300 were badly damaged. One hundred and fifty-four persons were killed and 99 seriously wounded. The damage to harbor installations and wharves during this period amounted to approximately 15 percent but, except for loss of shipping through sinkings, the actual use of the harbor was not seriously impaired. In the atomic bomb raid, 39 smaller ships were sunk in the harbor. The actual loss of tonnage and loss of life have not been officially computed, but they are estimated to be approximately 3,000 tons and 50 dead.

b. *The First Raid at Nagasaki* occurred at 0020 of 11 August 1944. Although the harbor was not damaged, this raid served the harbor forces with a practical impromptu exercise. There was an 8-minute early warning followed by a 12-minute "alert" starting at 2333, and by a "raid" signal at 2345, although the raid did not occur until 35 minutes after the sounding of the "raid" signal. The warning originated from the off-shore patrol by radio and the "raid" signal was given early. That gave ample time to assemble both the regular and the auxiliary water police units. The chief received reports from all fire districts of auxiliary water police, announcing complete assembly 10 minutes before the raid started. No action was required, however, except that district 2 furnished rescue and first-aid units to assist the stricken residential areas northwest of the harbor. This raid induced the auxiliary police to undergo a period of refresher training and drills.

c. The most successful operation of this organization took place during the second raid, 26 April 1945, although most of their efforts were devoted to rescue work. Auxiliary boats assisted in extinguishing 3 ship fires and in the rescue and evacuation of 80 seriously wounded and of several hundred slightly wounded personnel.

d. *Emergency Medical.* Each of the five emergency hospitals, established by the auxiliary units was staffed by a doctor, nurses, and nurses' aids. Their equipment and supplies were inadequate and their story can be found in another section of this report under "Emergency Medical Services". The responsibility of the rescuers ended with the delivery of casualties to the first-aid hospital.

e. *Shelters.* A large number of so-called shelters for use by the general public and harbor employees was constructed in the vicinity of the ferry landings and the principal wharves. They were shallow excavations covered with timbers and about 4 feet of earth and gravel. They had a crowded capacity of 40 to 50 persons. One incident only was reported of a direct high-explosive hit where 20 dead were identified. It was said that ship crews were required to stand by for the protection of their ships but that the majority of most crews would evacuate to seek shore shelters upon observing or hearing an alarm signal. This led to the practice, on the part of both the regular water police and the auxiliary water police, of devoting their energies to rescue work and clearance of channels, rather than to ship fire-fighting, merely making sure that burning ships did not sink in the traffic channels.

f. *Passive Defense Measures.* Camouflage was strongly advocated and required by regulations, but few examples of effective camouflage were observed. The use of smoke screens was frequently discussed by the harbor air-raid-protection council, but no equipment nor material was ever made available.

g. *Ferries.* Numerous passenger ferries plied across the harbor heavily loaded with passengers, but this service was reduced to one ferry in late evening and during the night. Regulations provided for ferry traffic to cease upon the sounding of the "air-raid" signal, but traffic continued under the "alert" condition and even under the "air-raid" condition to complete a passage, if the ferry was already under way. One such ferry, heavily loaded, received a direct hit near shore killing 139 passengers.

h. *The Atomic Bomb Attack.* The water auxiliary police and fire units were warned by an "air-raid alert" at 0740, 9 August 1945. At 0750 came the "air-raid" alarm which remained in effect until 0830 at which time the "release-from-air-raid" signal was given, but the auxiliary units remained mobilized throughout the morning. The flash of the explosion 2 miles from the head of the harbor was observed by the chief of the water police. The air pressure blast from the explosion flattened seven warehouses in the immediate vicinity of his station and small ships riding throughout the harbor were pushed over and sunk as if by a giant hand. The chief of the water police issued orders to all hands to take shelter or cover. When the subsequent fires broke out in innumerable places, the auxiliary subunits were found to be completely disorganized, many had deserted in fright to seek their homes or better shelter. No records were obtainable of harbor personnel casualties and most of the distressed persons on the water were left to shift for themselves. Recovery and reorganization were gradually accomplished over a period of several hours, many of the auxiliary subunits, too late to assist in the harbor, were diverted to rescue work in the devastated areas, where 4 days were required to extinguish the fires, and 10 days for rescue, treatment, and evacuation of casualties.

4. *Comments.* The organization for emer-

gency air-raid protection in this harbor, though far from perfect, was superior to that of the harbors previously studied, and the performance was creditable. Through the first five high-explosive and incendiary bomb raids, they demonstrated their effectiveness in water rescue but their weakness in fire fighting. The latter was understandable after an inspection of their fire-fighting equipment. The assistance of the regular fire department at scenes of shore fires was ineffective due to inferior and inadequate water supply, and no effective heads were possible by pumping from the bay with the equipment that they possessed. The complete breakdown on 9 August was inexcusable even in the face of the awe-inspiring spectacle of the atomic explosion. The water police and the auxiliary water police were already mobilized and because of distance and sheer good fortune, neither organization suffered more than minor casualties and their equipment, although basically inadequate, was largely intact. The failure here was definitely attributable to lack of discipline and authoritative leadership. Equipment for meeting the atomic, as well as previous raids, was woefully inadequate, but the policies of training, leadership and control were not strong enough to hold the personnel on the job in the face of a new form of attack, even though defense personnel were subjected to less personal injury or danger than in previous attacks.

V. PASSIVE DEFENSE INSTALLATIONS AND PRECAUTIONS

PROTECTIVE LIGHTING

1. *Introduction.* Since light control (Toka-Kansei) was patterned after the national regulations put out by the Ministry of Home Affairs, its details in Nagasaki were very similar to those reported in the Osaka, Kobe and Kyoto field reports, except that the time of application of the many phases varied slightly. Another difference found was that the instructions putting the various phases into effect reached the prefectural government through the regional governor (Kyushu Chiho) instead of directly from the Ministry of Home Affairs.

2. *Enforcement.* The national light control regulation issued by the Ministry of Home Affairs in April 1938, remained unchanged, except for varying degrees of enforcement as the war progressed. In the period from 1938 to 1941 there were occasional air-raid drills, sponsored by the military and usually held once or twice a year at the time of army maneuvers. The public, as well as industry, were requested to provide themselves with blackout curtains for windows, and shields for lighting units and to be ready to cooperate in drills. Those not having shields or curtains were to extinguish their lights. Immediately after Pearl Harbor (7 December 1941), the prefectural governor, acting on instructions, issued orders to extinguish all unnecessary outside lights, including neon and other advertising signs, display lighting, and lights in parks and around shrines. (Such reduction was reported to have been made in Osaka during 1939 and 1940.) A drive was put on in January 1943, to shield street lights and all other lights that were contributing to sky glow. (Such a drive was put on in Osaka in 1942 and in Kyoto and Kobe in April 1943.) Gate lights were completely extinguished by orders, dated 8 April 1943. The nightly application of the "alert" light control conditions between sunset at 2200 hours, the "alarm" light control condition between 2200 hours and midnight, and complete blackout after midnight was made effective some time during the fall of 1944. In March 1945 it was decreed locally that light control conditions applicable to the air-raid-alarm signal would be put into effect

as far as practicable immediately upon the sounding of the "alert." The reason therefor was Nagasaki's exposed position on the coast of Kyushu Island and the possibility that raids might come through with little or no advance warning. This change in the light control rules applied only in part to factories, in order to have only a minimum interruption of production.

3. *Public Cooperation.* Cooperation from the public was poor until after the night raid on 1 August 1944. Thereafter, cooperation on light control was good.

4. *Lighting Conditions.* Exhibit F gives pertinent data on lighting conditions in Nagasaki, and further shows the decrease in lighting due to the application of some of the preparatory light control measures immediately after Pearl Harbor and the application of additional restrictions in 1943, 1944, and 1945.

5. *Street Lighting.* There were three systems of street lighting in Nagasaki: That provided by the street car company for those streets on which their cars operated; the common system covering the other main streets; and the gate lights in the residential area, which consisted of a light provided by each home at the gate or doorway. A porcelain-enameled, steel dome-shaped reflector was the typical lighting fixture for both the street car company and the common system. Very little additional shielding was required to meet the specified 140° maximum cone of light distribution of the national regulation, particularly with the reduction of lamp size and the consequent raising of the position of the filament in the reflector.

6. *Vehicles.* Regulations governing vehicles were identical with the regulations cited in other reports, namely, the general brightness of headlights of all vehicles was reduced in 1943 and all headlights were further dimmed under "alert" conditions and extinguished under "alarms," and only those emergency vehicles suitably equipped with an appropriate cloth cover could move during the "air-raid" period.

7. *Railroads.* Railroads were to dim lights to the minimum upon the sounding of the "alert"

and to extinguish or blackout all lights, except shielded signal lights at reduced voltage, during "air-raid" status.

8. *Factories.* There was considerable exterior industrial lighting in Nagasaki requiring special attention, in order to have minimum interruption of production with some degree of safety. Floodlights and other highly revealing exterior lights around shipyards were extinguished at the "alert". Factories worked with lights dimmed and windows blackened out after the "alarm" was sounded until time they were warned of the presence of planes by their watchers or by other means. Despite the absence of night raids after the one in the summer of 1944, alarms caused by planes in the vicinity resulted in considerable interruption of night production. There were no industrial flames in Nagasaki to cause worry such as Bessemer converters, and others burning volatile gases.

9. *Harbor Lighting.* Ships in the harbor were to reduce the intensity of their lights under "alert" conditions and to extinguish or black out all lights upon the sounding of the "air-raid" alarm. Only 10 marker lights, located in the inner harbor, were in use. These were shielded from view from above and were allowed to burn until the time of the alarm. The lighthouse and the buoys in the outer harbor were extinguished early in the war, some as early as 1937, and the last one by August 1944.

10. *Home Lighting.* There were two types of

residential electric lighting service: one, the service to the fixed-rate customer where three or four outlets were supplied to a residence without being metered, and the customer was charged on the basis of 20 watts per outlet; and the other, the metered service. The power consumption figures shown in Exhibit F reveal the small amount of illumination used in the average Japanese home, and how light control measures further reduced their night seeing ability and efficiency. Each home was expected to install blackout curtains and suitable shields to prevent direct light from falling on windows or other openings.

11. *Comments.* Complete ignorance on the part of the general public and on the part of local civilian authorities as to the use of electronic means of guiding planes to targets gave them a misplaced confidence in the effectiveness of blackout. . In view of this, and of Nagasaki's exposed location, the system of going into "alarm" light control status at the sounding of the "alert", from March 1945, and of the three phases of blackout from the spring of 1944, is understandable. The institution of these two measures, particularly the former, drastically interfered with production, especially in the shipyards where operations required the extensive use of exterior lights. Because the first raid on Nagasaki was a night raid and some of the planes dropped bombs completely missing the town, the public believed in the effectiveness of blackout and cooperated fully in its enforcement.

SHELTERS

1. *Introduction.* The purpose of this report is to show how the national policy on shelter provisions was carried out, to indicate any variations from it, and to portray the various types of shelters constructed for family and public use in Nagasaki. Special consideration will be given to presentation of material describing the adequacy of types of shelters against the effects of the atomic bomb and to present information gathered from individuals who were in these shelters at the time of the explosion of the atomic bomb. The channel of directives and authority followed the same lines as reported in Osaka, Kobe and Kyoto.

2. *Development.* a. The responsibility for the planning, construction, and location of shelters in Nagasaki was vested in the engineering department of the city government. In October 1943 a

directive was received from the Ministry of Home Affairs which ordered each family to construct a shelter and the city to construct covered trench and tunnel-type shelters. The topography of Nagasaki lent itself readily to the construction of the latter-type shelters.

b. City officials stated that by 1944 each family had built a shelter, but that most of them offered only temporary shelter so that in 1944 the city began a program to construct tunnel shelters to provide protection for about 75,000 persons.

c. The plan for financing a construction program of tunnel shelters was for the city to construct and pay for the shelters and then to be reimbursed by the national government for two-thirds of the cost, but up to November 1945, the national government had not paid any part of the



Photo 24. Tunnel-type, timber-reinforced shelter dug into the wall of the terraced parking lot of the Nagasaki Prefecture courthouse. Entrance also from the opposite end. Built by the city for the public.

Photo 25. Concrete entrance and baffle wall to a tunnel-type shelter built into the side of a hill. No reinforcement inside. Built by and for the people of Obunamachi block association, Nagasaki City. Capacity 1,000 persons.



Photo 26. One entrance to the city constructed shelter dug into the hill in front of the Nagasaki City library.



Photo 27. Another entrance to the above public shelter.

cost. The tunnel shelters to be constructed by the block association were to be financed by the block association's furnishing the labor and paying for one-half of the material, while the city would pay the cost of the other half of the material. Up to November 1945, the city had paid its share of the shelters constructed in 1944, but has not paid any part of its share for those constructed in 1945.

3. *Types of Shelters.* a. *Family.* The home type of shelter was usually nothing but a hole about 3 feet deep dug beneath the house sufficiently large to accommodate the family. Some had sidewalls braced with timber but most often there was no shoring at all. Under raid conditions, these shelters became death traps, since both entrances were inside the house. Sometimes the family shelter was constructed in the yard or

other open space. In that case it was usually a semisurface type, reinforced and braced with timber, and covered with 2 to 3 feet of small stones and dirt.

b. *Semipublic Shelters.* Basements of the more heavily constructed buildings were used as shelters for the general public, but no additional reinforcement was added to them.

c. *Public.* (1) *Uncovered Trench.* These shelters were of the same general type of construction, capacity and location as noted in other target cities. By 1945, a large percentage of them had been covered with wooden boards and about one to two feet of earth.

(2) *Covered Trench.* The city and the block associations built 1160 of this type shelter which had approximately the same dimensions, capacity,



Photo 28. Concrete shelter built under the terraced mountainside. Built by the prefecture and used as the Nagasaki Prefecture air-defense headquarters and control center.

Photo 29. Workers breaking down a concrete shelter built for and by the railroad employees. Nagasaki Station, Nagasaki City.

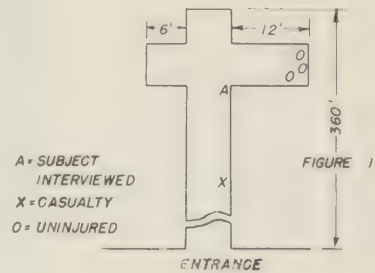


Photo 30. Concrete square shelter built for and by the navy personnel located at Nagasaki port. Concrete thickness at the base approximately 4 feet, tapered to 3 feet on top. Roof is of 2 feet by 2 feet planks, reinforced by approximately 1 foot of concrete and 4 feet of dirt at the thickest point.

and reinforced construction as those described in previous reports.

(3) *Tunnel.* The hills on which the greater part of Nagasaki was built, being composed largely of clay and limestone, offered excellent opportunity for the construction of tunnel-type shelters. During 1944 and 1945, the city built about $6\frac{3}{4}$ miles of tunnel shelters and the block associations constructed about $8\frac{5}{8}$ miles. Approximately 50 percent of these shelters were reinforced with heavy timbers and most of them had the entrances well protected by baffle walls. (Photos 24-25.) Two of these tunnel shelters constructed by the city were of reinforced concrete with the walls about $11\frac{1}{2}$ feet thick. The tunnels were divided into about 10 rooms, had a roof covering of 30 to 50 feet of earth and were equipped with elec-

tricity, seating arrangements, sanitary facilities, and two concrete updraft ventilators. The capacity of each was about 600 persons. These con-



crete shelters had three well protected entrances with an additional emergency exit. (Photos 26-27.) The city had planned to construct a number



Photo 31. The dimensions and design of the shelter and the location of the persons at the time of the explosion are indicated on Figure 1. The approximate location of the subject is marked "A" and the locations of the others are marked with the symbols "x" and "o". Additional persons were outside the entrance.

of these concrete shelters but the shortage of steel and cement compelled them to use timber for reinforcement.

(4) *Special Shelters.* The control center of Nagasaki was located in a shelter constructed along the specifications described in the preceding paragraph. (Photo 28.) As stated above and in previous reports, cement and steel were not available to the public after 1943, but it was observed that in many cases the military and industries engaged in war production were able to secure those materials to build shelters which would afford very good protection for their personnel. (Photos 29-30.)

Atomic Bomb Experiences

4. The purpose of this section of the report is to present the observations, opinions, reactions,

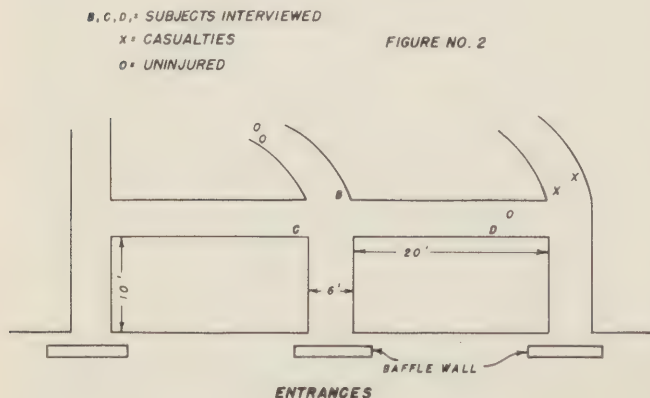
and effects undergone by a small group of individuals working in tunnel shelters at the time of the atomic bomb explosion. In addition, it presents the opinions of individuals and shelter officials who had made observations and investigations with regard to the protection afforded against atomic bombs by certain types of tunnel shelters. Exhibit *H* lists subjects interviewed who were in shelters at time of atomic bomb explosion.

a. Subject "A" and a number of other persons were working in a shelter located in the north side of an elevation, about 20 to 25 feet high, with the entrance approximately 200 yards from the estimated center of the bomb impact. The shelter did not have a baffle wall protecting the entrance, although material had been secured for that purpose. (Shelter 1, Exhibit *G*, and Photo



Photo 32. Shelter on which "B," "C," and "D" were working.

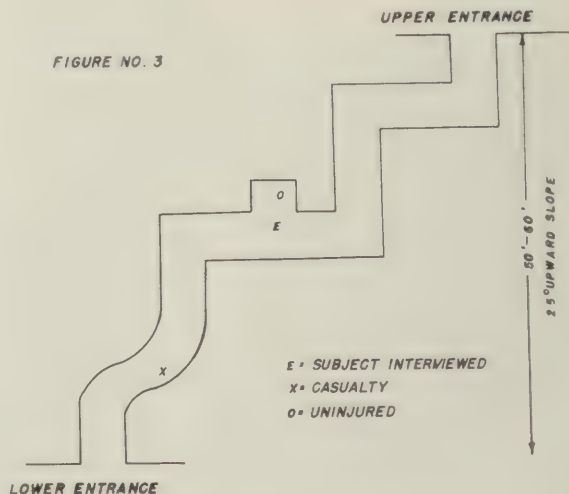
31.) Subject "A" was standing with her back toward the entrance when the explosion occurred. She was knocked over by the blast and was burned on the back of the legs and on the upper part of right arm. The scars remaining from the burns had the appearance of dark brown blotches which usually result from burns inflicted by hot



sparks. Subject "A" had been wearing cotton slacks of a dark green color which she had rolled up above her knees, and a sleeveless shirt. No burns were inflicted on any part of her body which was covered by clothing. Subject "A" stated that she has suffered no ill effects other than the burns. The persons working in the 12 foot T-section of the tunnel suffered no injuries or after-effects. A woman working at the spot indicated by "x" was facing the entrance and was burned on the face, arms, and upper part of the chest but she recovered and was not suffering any after-effects. All of the persons outside of the shelter were burned to death and an examination of their bodies indicated that all clothing had been burned off, flesh was charred and burned off in many places, tongues were hanging out, and eyeballs and teeth were knocked out as if from heavy pressure.

b. Subjects "B," "C," and "D," with about 20 other persons, were working on a shelter which was on an abrupt bank with an elevation of 50 to 60 feet (Photo 32) located about 600 yards directly west of the center of bomb impact. (Shelter 2, Exhibit G.) They were working in shifts with about eight persons inside the shelter and the rest outside at the time of the explosion. The type of shelter and locations of the subjects and the others in the shelter at the time of the explosion are indicated on figure 2.

Subject "B," who was in charge of the group, was thrown backward against the wall of the tunnel and was stunned for a brief period of time, but suffered no injuries. As soon as he was able, he went to investigate the condition of the people outside and found that all of them were badly burned and had their skin torn off in shreds, but that some of them had been able to walk or crawl into one of the shelter entrances. He realized that he could do nothing for them, so he went back into the shelter to do what he could for those inside. All of the persons on the outside died within a two-day period, and those who had been given water died almost immediately. Subjects "C" and "D" were both knocked over by the blast and stunned for a short period. Subject "B" received no burns or any other injuries, but he has had a tired feeling from which he does not seem to be able to recover, and also has suffered from "gas on the stomach." The only effect suffered by subject "C" was considerable bleeding of the teeth. Subject "D" suffered from diarrhea for about a month after the blast and seemed to catch cold very quickly. The persons whose locations are indicated by "X" were burned on the back and swelled up, but all of them have recovered with no apparent ill effects. The persons whose

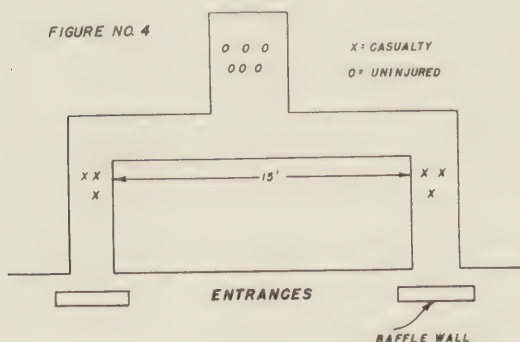


location is indicated by "O" suffered no injuries or ill effects. All of the subjects saw a flash and indicated that the blast was very hot. When they attempted to go out of the shelter the whole area was enveloped in a black or gray smoke through which they could see flames shooting high into the air.



Photo 33. The positions of the individuals in the shelter are indicated on figure 3.

c. *Subject "E."* This man was working with his wife and four other women at a shelter which was located on the side of the mountain about 800



yards from the center of impact. The subject was digging dirt which the women were carrying out. This shelter was built into a hill of clay and limestone and was not reinforced. Its capacity was

about 300. A baffle wall which protected the entrance was blown into the tunnel as a result of the blast. (Shelter 3, Exhibit G, and Photo 33.)

Subject "E" felt the blast only slightly. His cap was blown off and the light was blown out. He has suffered no ill effects. His wife who was working at practically the same spot with him was uninjured. She was pregnant and has since been examined by a doctor who advised her that there were no apparent injuries to her or to the unborn child. The woman who was at the location marked the "X" was slightly burned and knocked over by the blast, but she has fully recovered with no apparent ill effects. The three other women were outside the shelter and were killed by falling building debris. Subject "E" came out of the shelter about 1 or 2 minutes after the blast and everything was covered with a black or gray smoke; trees had been uprooted and burned, and all houses had collapsed.



Photo 34. The shelter and location of individuals are indicated in figure 4.

d. *Subject "F"*. This individual was an engineer employed by the city of Nagasaki to supervise the construction of tunnel shelters. He was not in a shelter at the time of the explosion but was at the shelter on the afternoon of the day of the explosion. (Shelter 4, Exhibit G, and Photo 34.) There were about 15 persons (indicated by "X's") standing in the entrances, who were killed as a result of the blast and the driving of the baffle wall into the shelter entrance. About 20 persons (indicated by "O's") who were in the part of the tunnel connecting the two entrances were only slightly burned and injured, and have recovered without any apparent ill effects. This shelter was about 800 yards from the center of impact.

e. *Subject "G."* This man was in a shelter constructed in a manner similar to the one shown in figure 2. He was in the same approximate location in this shelter as occupied by "D" in figure 2. He was unharmed but has been affected with diarrhea at various times since the explosion. (Shelter 5, Exhibit G.)

f. *Subject "H."* This man was on a truck at the time of the explosion on a main highway about 1,500 yards from the center of the impact. He saw a blue light flash, similar to that of a spark plug, and immediately ducked his head. The blast threw him against the side of the truck, cutting his head. The driver of the truck was also injured and in addition was burned on the side of the arm. The other occupant was only slightly hurt and all three of them survived. The truck was blown off the road into a rice field and turned over on its side. Subject "H" further revealed that he suffered from diarrhea for 3 or 4 days following the blast and has been constantly bothered by a tired feeling.

5. *Comments.* a. All of the subjects clearly indicated that upon coming out of the shelters the whole area was covered by a black or grayish smoke through which they were able to see flames shooting into the air.

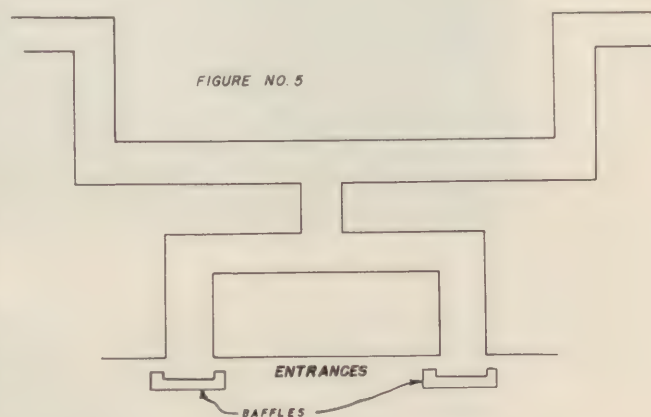
b. A large percentage of the subjects were affected with diarrhea as a result of the explosion.

c. It appeared as though clothing afforded some protection against burns when individuals were given additional shelter and protection.

d. It was the opinion of all of the subjects interviewed and of civilian defense officials questioned that if the people had been in the types of tunnel shelters as shown in figures 1 to 4, inclusive, and had taken the proper position therein (not in

the entrance) that most of them would have suffered little or no injury and no apparent after-effects. This theory is further strengthened by statements from officials who estimated that about 400 persons were in tunnel shelters at the time of the explosion and that about 300 of them were unharmed or only slightly injured because they had taken the properly designated positions and had remained in those locations for a reasonable period of time after the explosion. Figure 5 is a plan of a tunnel shelter which Nagasaki officials believed would offer a maximum of protection from the effects of atomic bomb blasts, if the explosion occurs in the air.

e. It has been variously estimated that by over-crowding there were sufficient tunnel type



shelters in Nagasaki to accommodate approximately 50 percent of its population at the time of the atomic bomb.

f. Investigation revealed that tunnel shelters of all types stood up very well from the blast and concussion of the atomic bomb. With the exception of baffle walls being blown into the entrances of the shelters, none of the tunnels collapsed. This situation was true even of those shelters which had no timber reinforcement. The pictures on the following page illustrate the conditions of tunnel shelters located 35 to 50 yards from the center of impact of the atomic bomb.

g. The probable reasons accounting for the small number of persons in shelters are:

(1) The day preceding the dropping of the atomic bomb the people of Nagasaki were ordered to shelters by an "alert" and "alarm" of several hours duration, caused by planes which later were found to be headed elsewhere.

(2) Many had taken shelter early in the morning and, since no raid had developed, had re-



Photo 35.



Photo 36. Pictures showing conditions of tunnel shelter entrances located 35 to 50 yards from the center of impact of the atomic bomb.

turned to their homes to prepare lunch and assume other normal activities.

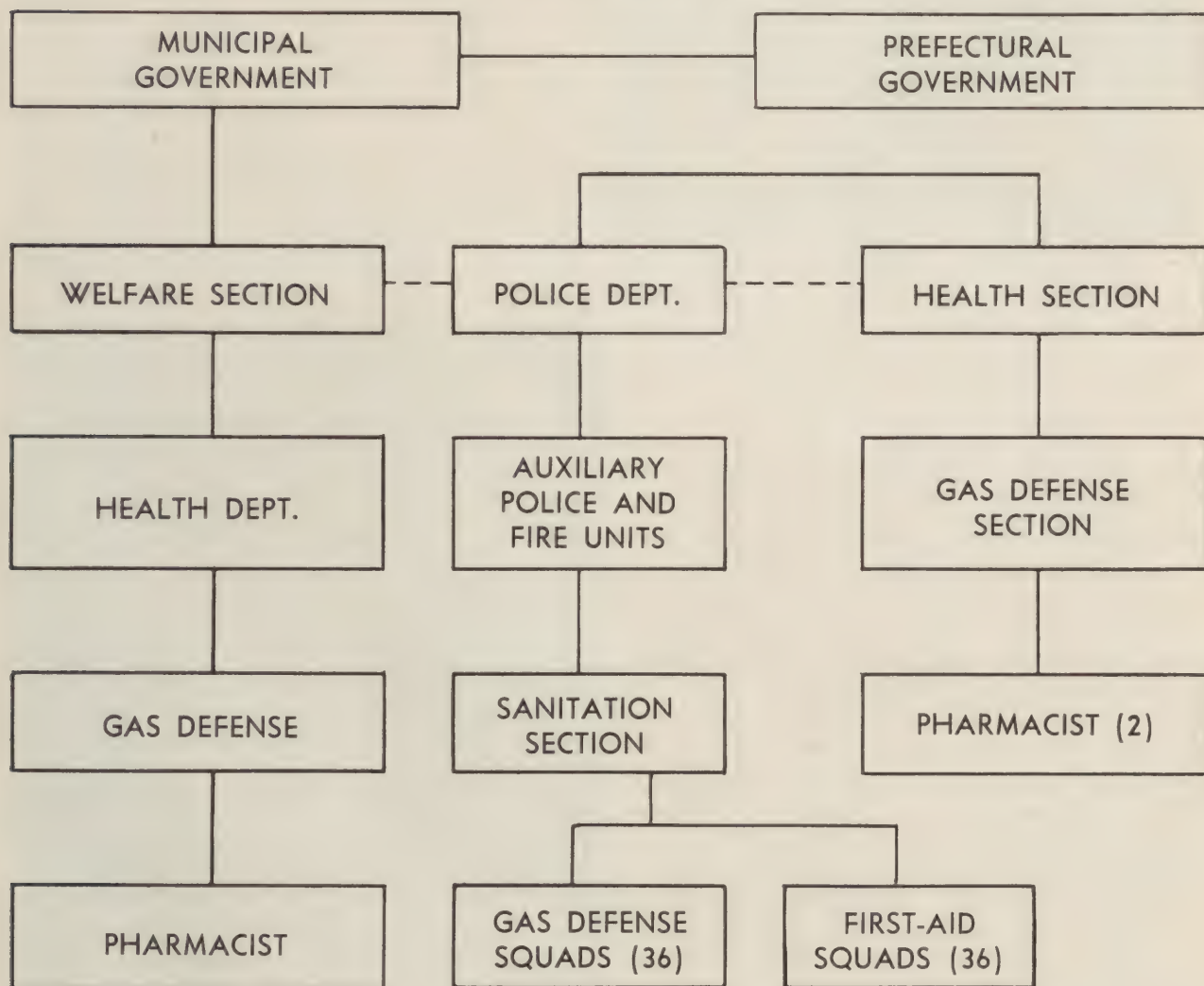
(3) Because of the proximity of adequate shelters it was the tendency of many persons to seek shelter only after the appearance of planes in raid formation.

(4) The planes overhead at the time of the atomic bomb was dropped followed the pattern of reconnaissance flights which the people had learned not to fear.

(5) In addition to the above reasons, which can be termed direct violations of regulations and

disregard of training ("Conduct of the Public During Air Raids"), the military authorities failed in their responsibility by (1) not advising the people of Nagasaki of the possibility of further raids similar to that made upon Hiroshima on 6 August 1945; (2) not directing all the public to take shelter when the appropriate signal was sounded; and (3) not ordering the "alarm" signal, inasmuch as it had been demonstrated that a single plane now could carry a destructive force equal to or greater than that carried by a large flight of planes.

ORGANIZATION—GAS DEFENSE



- - - Indicates issuance of orders

GAS PROTECTION SERVICE

1. *Introduction.* Essentially the same situation was found in Nagasaki as at other places that have been surveyed, namely, that as early as the "Manchurian Incident", interest in protection against poisonous gases ran high, but that as the war progressed to the point where the United States became involved, the impression that gas would not be used gained momentum and was accompanied by a corresponding and progressive lack of interest in gas defense. The whole gas defense program, with the exception of the purchase of gas masks, was therefore affected accordingly.

2. *Organization.* The formal organization for protection against poisonous gases did not take deep root below the level of the prefectural and municipal governments. Even at that level the organization was not clearly defined. The total force assigned full time to this work consisted of three pharmacists, one of whom was furnished by the air-defense organization of the city of Nagasaki, and the other two by the prefectural health department. These three men worked as a single unit regardless of their affiliation (Page 129). On the lower echelon, under the sanitation section of the police department, there were 36 gas defense squads, of 5 to 10 men each. There were also 36 first-aid squads which gave some attention to gas-defense technique.

3. *Functions and duties.* Although it was said at first that the sole duty of the pharmacists in charge was to teach the use of gas masks, it developed later in the questioning that they performed other important duties, including the procurement and distribution of gas masks, and teaching members of the auxiliary police and fire units the characteristic smells of different kinds of poisonous gases. The pharmacists were not, however, alone in their efforts to instruct the public in the use of gas masks. Various elements of the air-defense program taught that along with other air-defense measures. Also the air-defense general headquarters (Boku Sohombu) of the Ministry of Home Affairs occasionally sent representatives to the city, who assembled everyone concerned with air defense and taught them the use of gas masks. The latter then carried the instructions down through the block leaders and auxiliary police and fire units, who in turn instructed the neighborhood group leaders, and they finally taught the individual families. The train-

ing program was also supplemented by printed instructions which accompanied each mask.

4. *Gas Masks.* As indicated in paragraph one, interest in the procurement of gas masks developed as early as 1934. At that time, however, there were no gas masks. Production began on a large scale in 1938, when 250 masks were purchased by the city of Nagasaki and sold to one or more members of each block association. Between 1938 and 1944 there were 119,651 gas masks acquired by the people of Nagasaki City—enough to supply nearly 50 percent of the population. But since there were no sizes to fit children, this number probably provided one for nearly every adult. The large number of masks purchased by the public would seem to indicate a popular demand for them, but the circumstances leave some doubt in regard to that conclusion. At the insistence of the Tokyo government, large numbers of masks were manufactured, and because interest in gas protection went down as production went up, the manufacturers had large stocks of gas masks which they wanted to liquidate. Pressure was put upon the local air-defense units to sell these masks to the people, and quotas were set for each block association in accordance with the population. The block leaders decided who could pay full price for the masks, and who could not, and the price for the latter group was marked down. The average price for the several models was 3.50 yen, of which 2.50 yen was normally paid by the individual and the remaining cost divided between the Tokyo government and the city government. The peak of gas mask distribution was in 1942. Apportionment of gas masks was made by the air-defense general headquarters of the Ministry of Home Affairs, and masks were shipped to the city from either the Osaka or the Fukuoka supply depot. They were then apportioned and distributed through the usual channels down to the neighborhood leaders who finally delivered them to the people, collected the money, and turned it over to the city.

5. *Equipment Other Than Gas Masks.* It was found that some attention had been given to gas-proof clothing for workers who might be exposed to gaseous atmospheres. The record shows a total of 170 such suits, each consisting of hat, coat, pants, gloves and shoes, as having been secured by the city of Nagasaki (Photos 37-38.) They were placed in a city warehouse and were to be let out

Photo 37. Illustration showing front view of a suit of rubber clothing to be used for protection against poison gas. The material is a thin, non-chemically treated rubber and could not have withstood snagging and other types of rough usage.



Photo 38. Rear view of suit pictured above.

for use upon order from a responsible authority. For detection of poison gases, the city had four test kits (the same as used in Osaka). (For details see Osaka report.) They were not for use by local units, but only as a means of demonstrating to the members of the auxiliary police and fire units the odors that characterized the more common poison gases which might be encountered. When shown a list of equipment which the better organized gas defense squads were supposed to have ("Gas Protection Service" of Kobe report), the informants stated that most of those articles were possessed by the auxiliary police and fire units. They had not been acquired, however, specifically for gas-protection purposes, but rather for general rescue and first-aid work.

6. *Decontamination.* There were no plans for decontamination other than the use of calcium hypochlorite (bleaching powder) in the event that lewisite or mustard gas should be used.

7. *Construction.* Reference was made in various interviews to gas-proof air-raid shelters of which there were said to be six. Two of these were inspected and found to be nothing more than ordinary basement shelters with steel doors and gasket fittings for the exclusion of gas. These doors would have kept out gas, but they would also have excluded air which was essential to the lives of any who might have sought shelter there. These shelters possessed no means whatever of exchange ventilation whereby fresh air could be admitted and foul air removed, nor could air be brought in without admitting gas at the same time.

8. *Comment.* Since gas was not used at any time there is no way of determining how effective the gas-protection program would have been. The rudimentary structure of the organization, however, would under strain inevitably have demonstrated inherent weaknesses, if not utter futility.

CAMOUFLAGE

1. *Introduction.* The story on camouflage (Giso) in Nagasaki was almost a duplication of the camouflage story reported in the Osaka, Kobe and Kyoto field reports, except that in Nagasaki the camouflaging was done at a much later date. The army did paint a few oil tanks around 1939 to achieve a certain degree of camouflaging, but it was not until August 1944 that the Ministry of Home Affairs, at the suggestion of the military, requested the prefectural government to have some of the more conspicuous buildings camouflaged, and almost all of the work was done between then and March 1945. Prior to August 1944, owners of a few of the smaller factories did some painting on their own initiative which might have been considered camouflage.

2. *Local Situation.* The prefectural government's order of August 1944 put into effect the camouflage regulations previously issued by the Ministry of Home Affairs. These regulations were the same as the regulations issued in Osaka under the name of the Osaka prefectural government, and included in the Osaka field report as Exhibit S. These regulations, as in the other localities, were classified "secret" and distributed only to police chiefs, certain municipal government officials, owners of factories and large buildings, and a few essential persons. Theoretically,

the governor of the prefecture was responsible for camouflage, but his responsibility had been delegated, and in Nagasaki, the camouflage expert working with the prefectural police and the auxiliary police and fire units was a civil engineer employed by the prefectural government. Although in complete charge of camouflage, this individual had no special training in the subject, had only the general engineering background of his profession, had never been up in a plane or had the opportunity of studying aerial photographs of the town and vicinity, and his only information on camouflage was that obtained from reading the regulations and occasional bulletins put out by the Ministry of Home Affairs.

3. *Types of Camouflage.* Only two types of camouflage were found: one, the use of paint on buildings, either black or gray, or dirty brown or green, to darken the buildings in an attempt to blend them into the background of the locality, and paint applied in various patterns in an effort to break up plane surfaces; and second, the use of nets or screens to conceal possible targets. Only two examples of the latter were found: one, the use of fish nets supported on wires to conceal the characteristic rectangular pattern of the filtration ponds at the waterworks; and second, the use of bamboo poles to hide the characteristic

cylindrical shape of oil tanks. Painting was the type of camouflage most extensively used. The camouflage expert conceived the idea of floating shrubs on bamboo rafts in an attempt to create a false impression of the contour of the coast line and thereby to throw off the planes, but actually nothing was done in this matter. Because some of the planes attacking Nagasaki in the first raid of July 1944, missed the town completely and dumped their loads up on the mountains, the "expert" got the idea of erecting imitation roof tops and a few dummy lights at a point on the mountain about 3 miles outside the town, hoping to attract future night raids to that point. Because of the lack of official support and the shortages of material, particularly the latter, this idea never progressed beyond the stage of building one

or two sample roofs and selecting an appropriate site where power needed for the lights could be brought in readily.

4. *Factory Camouflage.* Nagasaki had two very large manufacturing concerns, the Mitsubishi Co. (steel mill, dockyards, arms factory, and electrical apparatus) and the Kawanami Kogyo Co. (dockyards); approximately 23 other manufacturers employing 25 or more people; also innumerable smaller industries, largely of the home type. Only the larger two had any camouflage and only part of their buildings were treated. The camouflaging used was largely flat black paint applied solidly, or in blocks to allow lighter shades to show through in an attempt to imitate the residential roof top pattern, or an irregular pattern in colors in an effort to hide



Photo 39. Photograph of one of the wings of the University hospital at Nagasaki, showing method of camouflage by applying black paint over portions of the yellow stucco finish. It was hoped to achieve an appearance of grayness at a distance to blend the building into the dark hills in the background.

edges of buildings and create a confusion. No attempt was made to hide large gas tanks, ship building cranes, drydocks or railroad yards.

5. *Other Buildings.* In addition to the factories, 15 other buildings in Nagasaki were camouflaged as follows:

a. *Schools.* Seven out of the 25 schools in town were camouflaged. The treatment varied with their normal finish, size, and location. Two large buildings in the center of town, finished in a yellowish stucco, had flat black paint applied in blocks 10- to 20-feet square, a similar size block being left unpainted in an endeavor to imitate the roof pattern of the neighboring houses. Three larger schools having a neutral gray stucco finish were darkened with a flat black and gray paint applied so as to permit rectangular and square sections of the natural finish to show through. Two smaller buildings were painted flat black to merge them into the neighboring dark buildings.

b. *Hospitals.* Of the five larger hospitals only the University hospital was camouflaged. Black paint was applied over the yellowish stucco finish except that the natural finish was allowed to show through in vertical stripes, the purpose being to create a grayness at a distance and to break up the larger plane surfaces. (Photo 39.)

c. *Public Buildings.* The three principal public buildings, the prefectural government building, the municipal government building, and the customs house, were all camouflaged. Their natural gray stucco was toned down by the application of matte black, allowing sections of the natural finish to show through in a block pattern.

d. *Office Buildings.* The Mitsubishi building, a 4-story yellow brick structure, was darkened by black paint, with a relief created by allowing certain vertical rows of bricks to show through. This was to create an illusion of grayness at a distance. The electric company building, finished in a white-face brick, was treated in the same manner. The Business Men's Club, a 4-story red brick building, was painted a solid black. The broadcasting sta-

tion, a neutral gray stucco building, was painted black in the block pattern to imitate the neighboring roof patterns. This building was directly under two very conspicuous radio towers and no attempt was made to hide them.

e. *Other Buildings.* A few other buildings were painted in a manner to meet the camouflage requirements, but no record was kept by the prefectural government, since these buildings had been camouflaged on the initiative of their owners and not at the request of the government.

6. *Other Camouflage.* The only camouflaging other than the painting described above, was the use of the fish nets at the water works and the bamboo poles over the small oil tanks which already have been mentioned. None of the harbor installations was camouflaged. Nothing was done to change the appearance of any of the natural landmarks or of the features typical to steel production or ship building.

7. *General Comments.* Local authorities felt that the relatively small size of Nagasaki was the main reason for the late date on which orders were issued to camouflage buildings in that town. Even with this lateness (August 1944) it was interesting to note that the camouflage instructions originally written in 1941 and designed to protect against the sporadic type of raid of one or a few planes visually seeking some principal target, was not changed. Either the Japanese were still not expecting mass raids, or their planning was too inflexible to allow changes to meet altered conditions. The camouflage as applied to the buildings in Nagasaki was a waste both of manpower and materials as it gave no protection against the type of raids Japan experienced. The inconsistency of the camouflaging or of the Japanese mind is exemplified by their completely hiding two small oil tanks with a cover of bamboo poles, while directly across the street, less than 300 feet away, were two huge gas tanks completely exposed.

CONDUCT OF THE PUBLIC DURING RAIDS

1. *Introduction.* Regulations issued on a national level by the Ministry of Home Affairs were relayed to the prefectural government through the regional governor (Kyusho Chiho). Variations needed to meet local conditions were met by directions of the prefectural police.

2. *Planned Conduct.* Newspapers, radios, posters, and other publicity means, activities of the auxiliary police and fire unit, neighborhood groups, and other civilian defense units were the means used to inform the public regarding their expected conduct. The "alert" signal was in-

tended to be a warning signal only, to alert the people and to cause as little interference with normal living as possible. Those at home charged with civilian defense duties were to check to assure that their equipment was in order; aged, sick and preschool children were to move toward shelters but all else was to continue normally. Factories, offices, and schools were to continue, stores and theaters were to remain open and traffic was to proceed in a normal manner. Those away from home and not engaged in any productive work were expected to proceed to their homes to be there in case a raid actually developed. Upon the sounding of the "air-raid alarm," schools and theaters were to close and occupants were to go to the vicinity of their home shelters if there was sufficient time; otherwise, they were to go to the vicinity of the nearest available public shelters. Hospitals were to start to move patients to shelters, ferryboats were to continue to the end of their run where passengers were to be discharged to go to cover. (New runs were not to be started.) Factories were to continue and street and tramway traffic was to proceed. People were expected to take advantage of this permitted traffic movement, and if not engaged in some essential work were to move to the vicinity of the shelter they expected to use in the event a raid developed. Because of these movements, street traffic generally increased immediately after the sounding of the "air-raid alarm" but tapered off quickly as people reached their destinations. The arrival of the planes overhead was signaled by watchers, and at their signals, all traffic stopped (except trains and ferryboats in the middle of a run) and all persons were expected to get under cover. Automobile and other traffic stopped immediately and the passengers were to seek the nearest shelter. Trains could proceed if railroad authorities so desired. If trains were stopped in a station, passengers were to seek nearby shelters; if trains were stopped out in the country, passengers were to remain in the trains. Factories were to stop production and all workers except those on special air-raid-defense duties were to seek shelter. No law actually compelled people to use the shelters, but laws were generally obeyed.

3. *Variation in Plans.* Following the raid in the summer of 1944, street traffic was required to stop for a short period after the sounding of the "air-raid alarm". That was a defensive measure against surprise attack, a distinct possibility be-

cause of Nagasaki's exposed position on the southwestern coast. Should no planes appear within 5 minutes, it was assumed that the signal had been caused by planes headed elsewhere, and traffic was allowed to proceed cautiously pending further signals. Originally women, small children, sick and aged were only to move to the vicinity of shelters and to enter when the planes were sighted overhead, but in August 1944, they were required to go into the shelter at the "alarm" signal and in November 1944, at the "alert" signal. From August 1944 primary schools were to close at the "alert" signal.

4. *Conducting the Public to Shelters.* Although it was one of the duties of the auxiliary police and fire units (Keibodan) to direct people to shelters, little directing of the general public was necessary because most people were either at home or at work and hence, near a familiar shelter by the time the "alarm" sounded. Almost any person could direct a stranger to a nearby shelter. The larger shelters were marked with signs and some had arrows or lines of white paint indicating the entrances. There was no established size for the sign or standardization of the lettering, simply a statement that it was a public shelter and giving its capacity.

5. *Regulations Within the Shelters.* The first person entering a public shelter was expected to be in charge to advise newcomers, preventing their entrance if the shelter became filled, or admitting them if it were not. This duty was rarely assumed and some shelters were overcrowded at times.

6. *General Comments.* a. The small variations in the rules governing the conduct of the people can be attributed largely to Nagasaki's exposed seacoast location. Because their first raid was a surprise, and because of the importance of their war industries, the residents of Nagasaki were reasonably air-raid conscious. It was unusual, therefore, to learn that very few people were in shelters at the time the atomic bomb exploded shortly after 1100, 9 August 1945. Investigation disclosed that the public had been under raid conditions for a long period the day before but no planes appeared. The morning the atom bomb was dropped they had had an "alert" signal, and an "air-raid alarm" signal. Because the flight of enemy planes were so high that few noticed them there was a "revert-to-the-alert" sounded before the appearance of the planes overhead.

Street interviews were conducted to check on the actual conduct of the public under this raid. The results are given in the table below:

*Summary of Street Interviews—Activity at Time
Atomic Bomb Exploded*

At home engaged in normal activity.....	30
At work or in school engaged in normal activity..	55
In an air-raid shelter.....	0

Action Immediately Following Atomic Bomb Explosion

Civilian Defense members:	
Assumed delegated duties	5
Ran away to hills.....	1
Killed	2
Not members of any Civilian Defense Organization:	
Rendered aid to neighbors.....	0
Ran to local shelter:	
Alone	5
With family	53
Ran to mountains or open country:	
Alone	4
With family	10
Not accounted for.....	5

The above is the result of interviews of 19 persons picked at random who, together with the members of their families, accounted for the actions of approximately 85 persons.

b. People dispersed to the hills or went into shelters for hours after the atomic bomb explosion as they were fearful that the planes bearing the bomb were only the first wave of a mass raid. Only garbled rumors of what happened at Hiroshima had reached the city, hence no one realized at the time of the raid that it was the same type of bomb.

c. Because there were relatively many good shelters in Nagasaki, the number of casualties would have been considerably less had people been in them at the time the atomic bomb exploded. That they were not can be attributed to two things: first, the failure of the army to anticipate further attacks similar to that on Hiroshima and so warn the public, and second, the complacency of the public due to a recent epidemic of alarms caused by planes headed elsewhere.

VI. EVACUATION AND WELFARE

EVACUATION

1. *Introduction.* Nagasaki, one of the cities upon which the atomic bomb was dropped, had done very little toward making effective precautionary plans for the dispersal or evacuation of non-essential persons including school children. It did have plans for immediate emergency welfare in anticipation of air raids and they were reported to have been sufficient up to the time of the catastrophic situation caused by the dropping of the atomic bomb.

2. *Definition of Terms.* As in the Kyoto report, the term "evacuee" is taken to mean a person who, as a precautionary measure, leaves or moves from the city at his own convenience to some other destination, whereas "refugee," or sufferer as the Japanese use the term, is one who has become an air-raid victim or sufferer by reason of damage to his home by bombs or fire or who had his home destroyed to create a fire break.

Evacuation of Civilians

3. *Authority.* Advisory instructions for carrying out evacuation of persons were received from the prefectural office in March 1945. The evacuation of specific groups of persons to relatives located elsewhere was urged and it was emphasized that such a move was to be carried out immediately and completed by the middle of May. The instructions were relayed to the block associations (Chokai) through a conference of their leaders who were urged to carry out the provisions as quickly as possible.

4. *Prefectural Plan.* The principal elements of the prefectural plan for the dispersal of persons "in order to render Nagasaki and Sasebo cities strong for air-raid protection" were substantially the same as found in other large cities, and included the following major items. (Exhibit I and Reference Item 13):

a. *Those To Be Evacuated:*

(1) Residents whose business was not in the cities;

(2) Those who had businesses disbanded or combined with others;

(3) Those living on annuities, pensions, rentals, interest, allowances, and the like;

(4) Those in the city only for their children's education;

(5) Those with two residences, because of having been retired or newly married;

(6) Any others whose business did not require their presence in the cities;

(7) School children below the second grade of primary school;

(8) Unweaned children;

(9) Pregnant women requiring care of a midwife;

(10) The aged, above 65;

(11) Necessary attendants.

b. *Policy.* The entire program was to have been voluntary and residents were persuaded that evacuation was for the purpose of everyone making a positive contribution toward increasing the country's war potential according to his ability to fill a necessary duty such as work in agriculture or munitions factories. Those in responsible positions were cautioned not to arouse any fear of air attacks or to create any tendency to flee from difficulties.

c. *Organizations for Carrying Out Evacuation:*

(1) A Nagasaki prefectural city evacuation headquarters (Nagasaki Ken Toshi Sokei Hombu) was to have charge of unifying and controlling the evacuation program.

(2) A Nagasaki City evacuation consultation office (Shi Sokai Sodensho) was to have been established and a police evacuation consultation office (Keisantsu Sokai Sodensho) set up in each police office.

(3) An evacuation council (Sokai Hyogikai) was to have been formed of officials and the secretariat of various bodies to speed the execution of evacuation.

d. *Methods of Carrying Out Evacuation:*

(1) The prefectural police and city authorities were to have made a basic census of the persons who should be evacuated.

(2) These authorities were also charged with urging and creating a desire for evacua-

tion through the media of meetings of neighborhood groups, the radio, newspapers, pamphlets and bulletin boards.

(3) In the reception areas (all areas outside of specifically prohibited zones were reception areas) the prefectural branch offices and councils on evacuation were to have developed an active spirit for the reception of evacuees and to have extended the movement to offer housing.

(4) Transportation and packing priorities were to be given evacuees as well as special rates and quick services.

(5) Letters of request were to be sent to the governors of the prefectures used as reception centers and their cooperation requested.

(6) Distribution of the certificates required for changing districts was made by the mayor's office. (Reference Items 14, 15, and 16.)

(7) Evacuation bonuses to those eligible for evacuation grants were determined on the following basis:

(a) Families of which 35-40 percent were called to military or wartime service;

(b) Those whose taxes were under 2 yen or who were exempt from tax. These two classes represented 80 per cent of those who qualified for grants.

In Nagasaki City those paying under 2 yen taxes were:

Those exempt from tax.....	700
Those paying under 1 yen tax.....	7,650
Those paying under 1.30 yen tax.....	3,119
Those paying under 1.70 yen tax.....	5,624
	17,093

(8) Evacuation to relatives was to be the fundamental principle and the basic census was to be made quickly and preparations completed for carrying out the plan.

(9) A conference of school principals on policies for school children evacuation was set for 4 April 1945.

(10) Evacuation was to be carried out immediately and finished by the end of May 1945.

5. *Refuges Due to Demolition of Houses (Tatemono Sokai)*. As early as October 1944, the prefecture for Nagasaki City issued instructions based upon information received from the Minister of Home Affairs, directing that a program be undertaken to create fire breaks to control the

spread of fire through the demolition of houses. The actual demolition was carried out in three stages by the engineer section of the prefectural office in cooperation with the police. Those persons whose homes were to be demolished during the first stage were urged to seek other places of residence within the city. The second stage, and by far the largest of the three, was carried out in April 1945. The refugees who lost their homes in this stage were urged to seek residence outside of the city. The third stage was started in July 1945, and was approximately 60 percent complete at the time of the atomic bombing on 9 August 1945. A conference discussing the plans for a fourth stage was in progress when the bomb fell. At no time did the plans of the prefectural authorities provide for any temporary housing to take care of these homeless refugees and no specific areas or prefectures were designated as reception areas, each refugee making his own arrangements with friends or relatives. Data giving the number of persons, including school children with their parents, who were compelled to seek other homes under this program were:

Locations	October 1944	Periods		
		April 45	July 45 ¹	Total
Within the city.....	4,190	17,316	3,250	24,756
To other places in the prefecture.....	499	6,608	302	7,409
To other prefectures.....	217	2,570	96	2,883
	4,906	26,494	3,648	35,048

¹Estimated to be 60 percent completed at time of dropping of atomic bomb.

6. *Voluntary Evacuees (Jinin Sokai)*. Although specific advisory instructions relating to the preparation of the city for air-defense protection through the dispersal of nonessential persons (Jinin Sokai) were not issued until March 1945, efforts were made as early as October 1944, at the time when the compulsory evacuation of buildings was ordered, to urge such persons to seek other locations. The results of these efforts are shown in the following data:

Locations	Periods			
	October 44	April 45	July 45	Total
To other places in prefecture.....	8,288	1,509	(¹)	9,797
To other prefectures.....	5,910	1,006	(¹)	6,916
	14,198	2,515	16,713

¹No data available.

7. *Statistical Summary.* The population of Nagasaki on 1 January 1945 was 286,439 persons. It was reported that 27,000 persons, including school children (21,500, see par. 10), or less than 10 percent of the population could be considered as evacuees. These data are summarized as follows:

	Refugees ¹	Evacuees ¹	Total ¹
To other places in Nagasaki prefecture.....	7,409	9,797	17,206
To other prefectures.....	2,883	6,916	9,799
	10,292	16,713	27,005

¹Includes school children estimated to be 21,500.

Evacuation of School Children

8. *Authority.* At no time were there any specific instructions received by the municipal authorities from the Minister of Education or the prefecture for the evacuation of primary grade school children.

9. *Drop in Enrollment.* There was a drop in enrollment in the primary grades in the late summer of 1944, when instructions were issued to certain prefectures other than Nagasaki, to evacuate their primary school children. Another drop occurred in April 1945, just after the heavy raids on Osaka and Kobe, and still a further decrease in July after the raids on Nagasaki itself. The educational authorities of Nagasaki City stated that as long as they had not received direct instructions to prepare a plan for evacuation of the primary school children, they would not initiate it. Another reason was the lack of funds for evacuation, the cost of which the city would have had to bear, unless the evacuation was ordered by the government.

10. *School Statistics.* The drop in enrollment of the primary school children was explained as being due, partly to voluntary evacuation and partly to the evacuation of the children with those families who changed residence because of the demolition of their homes to create fire breaks. The enrollment figures reported were:

1st—6th grades	1944	Drop in enrollment
April 1944.....	32,905
July.....	32,229	676
August.....	29,806	2,423
September.....	29,249	557
January 1945.....	29,090	159
February.....	29,006	84
March.....	28,887	119
April.....	23,542	15,345

1st—6th grades	1944	Drop in Enrollment
May.....	21,404	2,138
June.....	20,976	428
July.....	11,317	9,659
August.....	(²)	(³)
September.....	6,916	(⁴)

¹Heavy raids on Osaka and Kobe during March 1945.

²Heavy raids on Nagasaki latter part of July 1945.

³No data available. Atom bomb dropped 9 August.

⁴Data incomplete.

Even without a prefectural directive to evacuate primary school children, the data furnished indicated a drop in enrollment in the 1st to 6th grades inclusive, from 32,905 in April 1944, to 11,317 in July 1945 a difference of 21,588, or approximately 65 percent. It was estimated that about two-thirds of this number found reception areas within the prefecture of Nagasaki and the other third went to neighboring prefectures. This figure of evacuee school children was included in the data reported in paragraph 5 relating to homeless refugees.

11. *Comments.* a. Nagasaki had made practically no preparation for preraid voluntary evacuation of persons, even though advisory instructions were issued in March 1945, following the heavy raids on other parts of the empire. Had this preraid evacuation been insisted upon, the casualty list would have been lower. The reasons for this apathy are summarized as follows:

(1) Inability to inform the people that the city would be bombed intensively and that there was need for dispersal as a suitable war measure.

(2) The lack of transportation facilities on the island of Kyushu, and the railroad bottleneck at Moji, the principal point of entry between Kyushu and the island of Honshu, through which munitions and supplies for the war effort had to pass.

(3) The available housing in the prefecture had been used up by those whose homes had been demolished to create fire breaks.

(4) There was no gasoline available for civilian motor transport.

(5) There were not sufficient schoolhouses to send children in groups; parents did not want to leave their homes voluntarily, and since there was no order from the prefectural government, nothing was accomplished.

b. The evacuation of school children in groups was not undertaken although a number, on their

own initiative, did leave the city in April and June 1945, following the heavy raids in March on other parts of the empire.

POST-RAID EMERGENCY WELFARE

1. *Authority.* The basic authority for the Nagasaki City plan for postraid relief was taken direct from the war-time disaster protection law (Senji Saigai Hogo Ho) passed 18 September 1942 by the Nagasaki Prefecture, which law in turn was modeled after a similar law promulgated by the welfare ministry at Tokyo.

2. *Provisions of the Relief Section of the National Law.* The more important features of the wartime disaster protection law (Exhibit J) as it concerned postraid emergency welfare were:

a. The law applied to those who were injured due to a wartime disaster as well as surviving members of the family.

b. Relief was to be given to persons who needed emergency relief after meeting with a war-time disaster.

c. Types of relief were:

- (1) Supplying household effects.
- (2) Giving food in case of being burned out.
- (3) Giving and lending of clothing, bedding and other essentials.
- (4) Medical and maternity expenses.
- (5) Giving of school supplies.
- (6) Funeral expenses.

d. The prefectural governor was authorized to administer all relief measures.

3. *Provisions of Nagasaki Prefecture Official Bulletin.* As its part of the implementation of the national wartime disaster protection law, the Nagasaki Prefecture issued on 18 September 1942, an extra official bulletin (Exhibit K) publishing prefecture order No. 88, giving particulars for carrying out the provisions of the law. The important elements pertaining to emergency relief were:

a. The governor was to be notified when anyone received a wartime injury.

b. Funds to be paid for relief were limited as follows:

- (1) Actual cost for equipment for shelters, and when ordinary buildings were used one yen per individual for rental of rooms, and three yen per individual per day for room and three meals in inns or restaurants.

c. Because there had been no previous planning, survivors of the atomic bombing fled in disorganized flight to the surrounding hills.

- (2) Maximum of 350 yen per household for construction of temporary dwellings.

- (3) Maximum of 60 sen per individual per day for foodstuffs such as boiled rice.

- (4) Maximum of 20 yen per individual for clothing and 65 yen for bedding.

- (5) Maximum of 15 yen per individual or 45 yen per household for daily necessities such as dishes, cooking utensils, wooden clogs, umbrella, paper and towels.

- (6) Actual cost for medical and maternity service.

- (7) For school supplies, actual cost of books and a maximum of 2.50 yen per individual for stationery.

- (8) Maximum of 30 yen per individual for funeral expenses.

- (9) Actual cost of coolie hire or cartage for carrying out relief operations.

c. Granting of shelter, boiled rice and foodstuffs was for a maximum period of 15 days, but, according to the circumstances of the sufferer, permission might be secured from the governor in advance to extend the time of such relief.

d. Application was made through the municipal authorities by those who desired to receive relief and the application was then sent to the governor.

e. When persons received injuries by reason of war-time disaster and the municipal authorities felt that conditions were urgent, the mayor or head of the city had authority immediately to start to carry out the establishment of shelters and the distribution of boiled rice and then sought further instructions from the governor.

4. *Welfare Stations.* a. *Relief Stations.* In the early spring of 1943, the city designated 10 relief stations or centers, selecting generally the public schools because their locations were well known and they had kitchen facilities for the preparation of food. These relief centers were in reality first-aid stations where immediate medical aid would be given by doctors and nurses from the city, who were assigned to particular stations. It was reported that they were not used in the early

bombings, inasmuch as the university hospital was able to take care of all casualties.

b. *Consultation Centers.* Functioning as a part of the program for emergency welfare and relief to air-raid sufferers there were 19 consultation centers established by the city, each a sub-office of the municipal welfare office. City personnel upon notice of a raid went immediately to those stations and were prepared to issue sufferers certificates (Reference Item 17), and to give advice to sufferers and the noncasualty members of their families. These certificates were also available to sufferers at the relief stations. The consultation offices were set up usually in schools after each raid and continued operations for about 10 days thereafter.

5. *Preparation of Emergency Food.* Distribution of boiled rice to air-raid sufferers was probably the most important item of the emergency welfare plan. The original plan (Exhibit L; Reference Item 18) called for the preparation of the rice by professional cooks in 47 places, and then to utilize 23 places as distribution points, all under the auspices of the relief rice service unit (Takidashi Kokoku Dan). The supply of rice for this purpose was furnished by the prefecture.

6. *Effect of the Atomic Bomb on the Welfare Plans.* Nagasaki had experienced bombings before 9 August 1945 and their welfare plans under bombing conditions had functioned fairly well, but, with the dropping of the atomic bomb, the relief aid stations were unable to function as planned and the head of the medical services of the city (Kyugohombu) was forced to assign the doctors and nurses to places where they were needed most. The places for preparing the boiled rice were destroyed and plans of distribution disrupted so completely that the police had to take charge. The rice was prepared in outlying neighboring villages and brought into the city and distributed by the block associations (Chokai) and auxiliary police and fire units (Keibodan). The relief stations had been destroyed and no buildings were available, so that the distribution was made out in the open to those who applied for foods. The following tabulation was furnished by the welfare department of the city showing that, during the 10 days following the dropping of the bomb, 650,250 meals were served, of which 52,000 were of dried bread and 598,250 were of boiled rice. Approximately 1,050 bags of rice were used for that purpose.

Date	Breakfast	Dinner	Supper	Total
9 Aug. 45.....		25,000	71,000	96,000
10 Aug. 45.....	65,600	67,500	67,500	200,600
11 Aug. 45.....	53,600	47,400	41,300	142,300
12 Aug. 45.....	27,500	28,900	33,400	89,800
13 Aug. 45.....	26,800	23,400	27,000	77,200
14 Aug. 45.....	22,350	5,500	2,100	29,950
15 Aug. 45.....	1,200	1,500	1,500	4,200
16 Aug. 45.....	1,200	1,200	1,200	3,600
17 Aug. 45.....	1,200	1,200	1,200	3,600
18 Aug. 45.....	1,000	1,000	1,000	3,000
	200,450	202,600	247,200	650,250

After 5 or 6 days the air-raid sufferers were expected to have made their own arrangements for food and shelter and that is fairly well borne out by the drop in the number of free meals served by the city after 5 days to the air-raid sufferers. One other item indicating the size of the problem confronting the authorities as a result of the atomic bomb was the tremendous increase in the number of air-raid sufferer certificates issued (Reference Item 17). These carried with them certain privileges relating to pensions and claims which are discussed in another section of this report. Prior to 9 August, not over 1,000 of these certificates had been issued for all of the raids on Nagasaki; however, immediately after that date, more than 47,000 certificates were issued and the claims and pensions resulting therefrom are now in process of being paid with funds from the national treasury. Another difficulty encountered by the municipal officials was the lack of temporary shelter, as none was available, so complete had been the destruction wrought by the bomb.

7. *Post-raid Housing.* During the late spring of 1945, the Welfare Ministry initiated a program to provide housing for homeless air-raid sufferers before cold weather set in. It was implemented through the building construction corporation (Jutaku Eidan) with an imperial grant of lumber to be used for that purpose. In all, approximately 300,000 small houses of wooden construction were to be erected throughout the empire with an allotment of 2,000 for Nagasaki. The corporation, a non-profit organization, arranged for the construction, and, if necessary, the financing, either of an individual house or of a group of houses, upon the direction of the municipal government which placed the plan in effect on 10 October 1945. Should a person desire to have such a house on his property, application had to be made to the office of the chief of the welfare section of

the city. The cost of such a house was 2,500 yen and if financing were required, the banks had been instructed to make loans for that purpose at a low rate (3.6 percent). It was reported that up to the time of the investigation in Nagasaki, no applications had been received for any loans and local discussion indicated that the price of 2,500 yen appeared to be high, and doubt was expressed whether there would be any more than 500 of 600 houses erected this year. The first model house (Photo 40) was being erected at the time of this study.

8. *Comments.* a. Welfare aid stations, each a suboffice of the municipal welfare office, had

been designated in advance of raids and functioned fairly well for small raids.

b. Provision was made for preparation of emergency food at 47 places throughout the city by volunteer professional cooks. Supplemental arrangements were made with outlying communities and during the atom bomb catastrophe these supplemental places became the major source of emergency food preparation.

c. The atomic bomb destroyed relief stations and other buildings and distribution of food was made out in the open to those who applied. In all, over 650,000 meals were served during the 10-day period following 9 August 1945. About 98 percent of these were during the first 5 days.

WAR DAMAGE CLAIMS

1. *Introduction.* The following report will cover the Nagasaki experience with the four types

of war insurance and compensation provided by the national government to indemnify Japanese



Photo 40. Sample house constructed under the auspices of the building construction corporation at Nagasaki. Estimated cost, 2,500 yen.

nationals victimized by air raids. New aspects of these laws brought out by interrogations will be summarized, and comments made from the insurance standpoint upon the behavior of the city's residents.

2. *War Casualty Insurance (Senso Shibo Shogai Hoken).* a. *Development of Interest.* Very little attention was paid to the government provision for war casualty insurance when it was first promulgated. Little was done to persuade the people to buy it, although two companies paid for small newspaper advertisements explaining its advantages. Life insurance officials frankly stated that they were more interested in selling the private company policies than they were in selling the government policy, particularly when the private policy coverage was extended to include casualties resulting from acts of the enemy. The salesmen made no effort to induce people to take out policies when their commission per policy, whether for 500 yen or up to the limit of 5,000 yen, was only 50 sen. On 12 January 1945, the commission for the salesmen was increased by order of the finance ministry to eight per cent of the premium, and the results reflected a great increase in the industry of the salesmen. It was thought at first by the national government that the announcement of the inexpensive coverage would meet with considerable response, but the people of Nagasaki did not feel that they were in danger, nor were all of the people aware that the policy existed despite the newspaper advertisements and the word-of-mouth circulation of the information. Insurance officials pointed out that in Japan a large number of older people could not read; therefore, the guide to war casualty insurance distributed by the finance ministry (Exhibit M and Reference Item 19) was not widely read. Furthermore, verbal explanation of what was offered failed to arouse individual action. The most significant reason for the ignoring of the war casualty insurance yet encountered in the several cities studied was given by the Nagasaki officials when they said that many people in Japan do not take out insurance on the grounds that doing so hastens the day of death. That was given as the reason that on the day the atomic bomb fell only one-third of the population of the city was covered by war casualty insurance, and a much smaller number had private policies. There was some increase in war casualty applications after the Yawata raid in June 1944, and no in-

crease at all in applications for private policies. The same war casualty policy covered both soldiers and civilians, with a 3 yen per thousand premium for the latter and for soldiers at home, but 10 yen per thousand for the military overseas. On 1 January 1945, this differential in premium was removed, and that, together with the previously mentioned increase of salesmen's commission, contributed to an increase in war casualty business. The insurance officials admitted that this increase was not entirely unrelated to the increasing intensity of the raids, but, judging from information as to other air-raid-protection measures, it is quite possible that the advancing danger was not so important a factor in the increase as might normally have been expected. Officials made the statement that it was not until the end of July 1945, that "the people began to wake up and realize the seriousness of their situation."

b. *Administration.* Less than 1,000 of the war casualty policies issued in Nagasaki were handled by the 11 fire and marine companies, so that the administration was done mainly by the 12 life insurance companies doing business in the city, 8 of which had branch offices and 4 had only individual representatives of branch offices in Fukuoka. The following table is based upon figures obtained from the 8 branch offices of the life insurance companies. Records of all war casualty policies issued by the fire and marine companies were sent to Fukuoka and could not be obtained during the visit to Nagasaki, but since the number of policies issued by them was so small, the table below, supplied by the life insurance control association, can be taken as fairly significant:

	As of 1 Aug. 1943	As of 1 Aug. 1944	As of 1 Aug. 1945	As of 1 Sept. 1945	As of 1 Nov. 1945
Population of Nagasaki (round figures)	284,000	281,000	225,000	153,000	(¹)
Number of policies in force	51	8,650	84,759	86,448	86,558
Number of casualties Dead and injured	0	46	988	50,018
Number of claims pre- sented	0	3	92	356	1,520
Number of claims paid . .	0	0	20	208	774

¹Unknown.

This table contains several items of interest. Only 51 policies were in force nearly a year and a half after the insurance was made available to the public, or less than two-hundredths of 1 percent

of the population. Two months after the B-29s began hitting the Japanese mainland, or in August 1944, the figure was still but a bare 3 percent. After sustaining major damage and numerous casualties from several raids and with ever greater blows clearly indicated for the immediate future, the total had risen to one-third. Officials were asked whether the rise in the number of policies in force between 1 September and 1 November 1945, might be attributed to new policies applied for out of fear of the behavior of the American occupation troops, a situation which was found to be true in Kobe. The officials were highly amused at this suggestion, and said that the behavior of the United States Marines had been exemplary and that no such fear had been reflected in the applications for wartime insurance. They explained the rise as due to a lag in book-keeping, and that these policies were those of servicemen overseas and not new policies taken out for civilians in Nagasaki. The enabling act for the war casualty insurance was still in effect during this period, and, as of the time of this report, had not been abolished so that technically a person could still take out a policy under its provisions, although no new applications had been received. The three claims presented as of 1 August 1944, before the city was hit by air raids, were said to be those of soldiers at the front and not claims for injury during blackouts or air-raid training, for the law did not indemnify persons for death or injury except under conditions created directly by the enemy.

c. *Payment of Claims.* The table above is noteworthy for the small number of claims presented and claims paid, considering the number of casualties in Nagasaki. For example, as of 1 August 1945, before the atomic bomb, there were 988 casualties in the city. One month later, there was a total of only 356 claims *presented for payment*, and, in the meantime, more than 50,000 casualties had been sustained. It was stated by the insurance officials that 80 percent of the claims paid between 1 September 1945 and 1 November 1945 were for atomic bomb victims and that there were still several hundred war casualty policyholders, as of 1 August 1945, whose claims had either not been presented or had not been paid. Despite the difficulties involved, it was confidently stated that unless the Japanese economy should collapse, all claims presented would ultimately be paid. However, the principal amounts in the policy for death and injury

were small, even before the beginning of inflation, and the reduced buying power of the yen might be held accountable in part for the small number of claims presented.

d. *Appeal.* The same legal provisions for appeal by a claimant were in force as in previously studied cities, but no appeals had been made in Nagasaki by 16 November 1945. There had been many private complaints by individuals over the delay in getting money due them, but the loss of records from the bombing, the scattering of people, and the red tape involved in clearing claims for payment disrupted and confused the insurance companies, and the work piled up faster than it could be handled. The assembling of proof of casualty and of beneficiary was a complicated affair and time-consuming under the most ideal of conditions; and the Japanese were said to be quite used to delays, so that no complaint had reached the legal stage. The war casualty policy provided that, even though it ran for but one year, the government would pay death benefits on those persons injured while the policy was in force, if they died within 6 months after the policy expired. Officials anticipated that the check-up on injury claims from the atomic bomb would be very difficult, and that there was an easy chance for abuse in spite of the complicated system of certification required of the claimant; yet they did not expect that any appeals would be made, if claims presented were turned down.

2. *War Damage Insurance (Senso Hoken Rinji Sochi).* As elsewhere ascertained, there was in Nagasaki far more interest in war damage insurance than in war casualty insurance. This statement was made in conference by both life insurance and fire and marine insurance officials; it cannot be supported by a table of statistics as presented in the section above for all data on issuance of policies were claimed by the fire and marine men to have been sent to Fukuoka and they were unobtainable at the time. The only figures immediately available follow:

	As of 1 Aug. 1945	As of 1 Sept. 1945	As of 1 Nov. 1945
Number of buildings destroyed in Nagasaki	476	20,063	20,063
Number of claims presented . . .	162	2,173	13,570
Number of claims paid	162	2,173	10,852

The number of claims presented as of 1 August 1945, for war damage to property, was double that for casualty, and as of 1 September 1945, it

was almost five times as large. This might not be considered particularly worthy of note, if the weapon used against Nagasaki had been incendiaries, for in Kobe and Osaka the actual amount of damage was much greater to property than to life and limb. But the raids on Nagasaki were either high explosive or atomic, and the casualty figures ran ahead, relatively speaking, of the property damage figures. It is noteworthy also that every claim presented as of 1 September 1945, had been paid, and that on 1 November 1945, the lag between claims presented and claims paid was not great. The promptness of payments on property insurance as compared with casualty insurance was explained as being due mainly to the amount of red tape involved in collecting the certifying papers necessary for casualty payments. The fire insurance companies also made efforts to clear their books of outstanding obligations by inserting advertisements in the newspapers urging people to apply for the money due them. Three companies, beginning September 1945, published each month in the papers a schedule for the payment of claims already filed, in order to distribute evenly the clerical work involved. As in the case of war casualty insurance, no appeals had been recorded involving disagreement between claimants and companies over details of claim settlement.

3. *Air Defense Service Allowance (Boku Ju-jisha Fujorei)*. Before the atomic bomb, 20 applications for money under this compensation plan of the national government had been received by the prefectural peace preservation section (Hoanka) which administered it for Nagasaki Prefecture. Of these, 11 had been paid by 15 November 1945. This law was administered wholly by the prefecture and had no connection with the city office. The 11 claims paid or in process of payment were all for residents of Nagasaki City, the remaining 9 unpaid being from Omura. The applications of the latter, complete with verifying police and physician's certificates, were sent in to the prefecture without being accompanied by a doctor's bill and could not be paid; the authorities were attempting to clear up the outstanding claims by letters asking that the bills be sent in. Three of the eleven claims paid for Nagasaki persons were for members of the auxiliary police and fire units and the remainder were "household fire fighters" some of whom were women. A copy of the records kept on the certification and payment for one such case is at-

tached to the report as Exhibit N. (Reference Item 20). No claims under this law were paid in Nagasaki for any property damage or casualties resulting from the atomic bomb, on the grounds that the law covered those persons actually engaged in air-defense operations, and "there were no air-defense operations possible in connection with the atomic bomb attack." Victims of the atomic bomb were compensated under the war disaster law, the operation of which in Nagasaki is discussed in the next section.

4. *War Disaster Protection (Senji Saigai Hogo)*. a. *Casualty and Property Damage Claims*. Although the actual payment of money under the war disaster protection law (Senji Saigai Hogo Ho) was made by the prefectural finance office after review by the welfare bureau of the prefecture, the claimants in Nagasaki City presented their applications for compensation to the welfare office of the City, and that office assembled the proof required for payment of the claim. On 30 October 1945, all claims up to 28 July 1945 had been paid, and the prefecture began paying on claims filed subsequently to that date. The following table of compensation claims filed and payments made was supplied by the city welfare office:

	Preatomic bomb	Postatomic bomb
Death benefits to beneficiaries:		
Filed.....	84	1,154
Paid.....	84	0
Compensation for injuries:		
Filed.....	8	25
Paid.....	8	0
Compensation—house damage:		
Filed.....	8	709
Paid.....	4	0
Compensation—household effects:		
Filed.....	53	1,489
Paid.....	48	0

In view of the fact that there were 988 casualties reported for the city as of 1 August 1945, and the fact that all Japanese nationals were entitled to receive indemnity under the law, even though they were covered also by war casualty and private life insurance, the number of applications for indemnity under the law seems very small. As will be seen from the application form for war disaster compensation (Exhibit O and Reference Item 21), the applicant was obliged to state both whether his annual income exceeded 7,000 yen and whether his independent income exceeded 3,000 yen. In either of these cases, if the answer were

affirmative he could not collect anything under the law. The prefectural welfare official stated that, in his opinion, there were many persons eligible for the indemnity, who had not made application, and that, similarly, there were relatively few persons disqualified by virtue of receiving other monies from the government under different compensation laws. He was unable to explain the reason for the disinterest in the casualty compensation; nor could he give any reason for the fact that, although there were 476 homes reported by the fire and marine insurance companies to have been destroyed as of 1 August 1945, there had been but eight applications for war disaster compensation. The top limit paid under the wartime disaster law was 1,000 yen, but nothing would be paid on a house already insured for 1,000 yen or more under the war damage insurance law. If the owner had no war damage insurance whatever, he could collect the full 1,000 yen; and, if his house were insured for a lesser amount, he could receive an amount under wartime disaster compensation equal to the difference between the insured amount and 1,000 yen. Figures were not immediately available as to how many of the war damage insurance policies were in force in Nagasaki, or in what amounts, so it is not possible to explain low figures in the table. The nonpayment of any war disaster claims since the atomic bomb was explained as being due to the destruction of records when the prefectural building was gutted by fire, but the official in charge claimed to be ready for the renewal of payments, as of the time interviewed, 16 November 1945. The rate of claims filed took a sudden jump early in November, and based upon that, the officials administering the war disaster law estimated that the official casualty figure supplied to them by the police was probably far too low.

b. *Expropriation Under the War Disaster Law.* A sidelight on Japanese policy with regard to the rights of private individuals was brought out by interrogation of prefectural officials in charge of administering the war disaster law which contained provisions for indemnifying owners of commodities or buildings taken over by the government for emergency relief purposes. There were no instances of expropriation under the law in Nagasaki Prefecture, although the governor was empowered to do so; the reason was given that in so far as possible the national government

did not want the prefecture to interfere with the right of ownership, and had, therefore, collected supplies for emergency use through other means than expropriation. Nagasaki officials stated that the governor of Osaka Prefecture had utilized the power authorized by Article 13 of the law for expropriating food. All use of private homes in the Nagasaki area was by permission of the owners and payment was made to them under the war disaster law.

5. *Compensation Under the Firebreak Program.* For the four firebreak programs, beginning with the first one in October 1944 (1,129 buildings) and continuing through the last which was still in progress when the war ended, compensation to owners had been completed as of 1 November 1945, for only the first operation; for the second and third program (6,921 buildings) 80 percent of claims had been settled; and payments were to begin for the fourth (864 buildings) on 20 November 1945. Administration of the compensation plan in Nagasaki was found to conform with the procedures used in cities studied earlier. The national law governing the compensation permitted minor tailoring of its provisions to suit individual prefectures. Thus, for example, a slightly different scale of values for assessing the condemned properties was used in Nagasaki, resulting in a somewhat lower rate of return to the owners than in Kyoto or Kobe. Under the plan whereby the prefecture purchased the houses from the owners, the arrangement for the first of the programs was that, if the owner retained the materials from the demolished houses, the government paid only 50 percent of the assessed value, and 100 percent, if the government took the materials. Later, for the succeeding operations, the government increased to 80 percent of evaluation its payments in case owners wished to keep the materials, and continued to pay 100 percent if they did not. Payments were made to the survivors of deceased owners, if sufficient proof of relationship could be established. The same compensation plan for the moving of owner's effects was found to be used in Nagasaki as in other cities studied. Figures for loss of business payments for owners dispossessed by the firebreaks program were supplied by the chief of the prefectural commerce and industry section which handled this phase of the compensation plan. (Amounts are in yen).

	Up to 1 March 1945	1 Mar. 1945, 1 June 1945	1 June 1945, 1 Nov. 1945	In process 15 Nov. 1945
Prefectural funds:				
Amounts.....	229,770	45,830	614,302	140,000
Persons.....	185	54	1,023	15
National Welfare				
Treasury funds:				
Amounts.....	1,173,878	112,370	0	1,061,508
Persons.....	393	55	0	338
Totals:				
Amounts.....	1,403,648	158,200	614,302	11,101,508
Persons.....	578	109	1,023	353

¹Estimated.

The distinction between the amounts paid by the prefecture and those paid by the national welfare treasury was explained in the Kyoto report.

6. *Comments.* The Nagasaki study brought out more clearly than any of the preceding ones the wide gap between what was provided by the government for the financial protection of the Japanese public on the one hand and the understanding and utilization of that protection by the public on the other. The frankness with which the life insurance officials expressed their greater interest in promoting the sale of their own policies as against the promotion of inexpensive government coverage was surprising. The most revealing statement made to explain the relatively small number of government policies issued was that regarding the superstitious attitude of the Japanese people toward insurance itself, an explanation not encountered in previous interrogations in other Japanese communities. It is possible that the people of Nagasaki were more superstitious

than people in the metropolitan areas of Japan studied earlier; but particularly for older persons, this explanation may prove to be important in explaining the indifferent reception given the government's provisions for war damage and war casualty all over the country. The details of governmental red tape involved in the payment of insurance claims and wartime compensation served to explain not only the slowness with which claims were paid, but also the reluctance which characterized the application for war insurance and for payment of insurance and compensation claims. It is an interesting commentary on the reaction to the atomic bomb that the people believed for a time that, because of the revolutionary nature of the catastrophe, the government might absolve itself from all financial responsibility for the payment of insurance claims and war disaster protection compensation. It was not until the insurance companies assured the people through statements in the newspapers that they were prepared to fulfill the terms of the insurance contracts that this feeling was dispelled. That the prefecture considered the atomic bomb attack as an entirely new and final form of disaster is borne out by the fact that the war service allowance law set up to cover air watchmen, auxiliary police and fire personnel and others actively engaged in air defense was not considered to have applied to any victim of the bomb, and such a person would therefore receive compensation under the less favorable terms of the war disaster law.

VII. TRAINING

TRAINING OF CIVILIAN DEFENSE PERSONNEL

1. *Introduction.* The purpose of this section is to describe the air-raid protection training schools, the methods for selection of civilian defense personnel, and the training procedures used. All directives on training originated in the Ministry of Home Affairs and were sent down to the prefectural government and from there distributed to the several political subdivisions. The first directive with regard to training was received in Nagasaki City in 1939. Informal training was started in the middle of 1940, but a formalized training program was not instituted until the fall of 1941.

2. *Training Schools.* a. *Air Defense School (Boku Gakko).* This school was established and administered by the Great Japan Air-Defense Association (Dai Nippon Boku Kyokai) in 1940, but, as stated above, was used informally only for theoretical and practical training. In 1941 the national headquarters of the Great Japan Air Defense Association ordered the school to prepare and to conduct a formalized training program in air-raid protection services. The secretary of the Nagasaki branch of the association became the secretary of this school and another member of the Nagasaki branch was appointed as treasurer of the school. Each of these persons received a salary of 650 yen per year and they handled all of the administrative details in connection with the conduct of the school. There were two permanent instructors, each of whom received a salary of 1,200 yen per year. The salaries of all of these persons were paid by the national headquarters of the Great Japan Air-Defense Association and, in addition, the national headquarters contributed from 3,000 yen to 5,000 yen for the maintenance of the school. If these contributions did not provide for all expenses of the school, the balance was paid by the Nagasaki branch. A number of sessions of the school were conducted primarily for groups from sections of the prefecture outside of Nagasaki City. Transportation expenses for those attending were paid by the organizations which selected them to attend the school, while the Nagasaki branch furnished rations and quarters.

All of the training material such as pamphlets, posters, and moving pictures used in the school were furnished by the national headquarters of the Great Japan Air-Defense Association.

(1) *Instructors.* In addition to the two full-time instructors mentioned above, additional instructors were recruited from leaders of police, fire and other organizations who had been sent to the air-defense school in Tokyo for a 10-day training period. One of the full-time instructors had been trained at the air-defense school in Tokyo, while the other was the former chief of the fire department of Nagasaki Prefecture. Specialists, such as doctors, were used for instructing in specialized subjects. Each session of the school had a maximum of seven instructors. With the exception of the two regularly employed instructors, no compensation was given to other instructors.

(2) *Trainees.* Personnel to attend this school were selected from among the leaders of the police, fire, and other organizations concerned with air-raid protection, including air-defense units from factories. This method of selection was also used for those who lived in areas outside of Nagasaki City.

(3) *Curriculum.* A formalized curriculum and a regular schedule of classes was prepared in accordance with the directive of 1941 (paragraph 2a). Each session of the school covered a period of 4 days with the first 3 days devoted to the training of representatives from the police, fire and auxiliary units, while the fourth day was given to instruction of factory defense units and air-defense sections of block associations. The class periods were 2 hours in length, with the morning classes devoted to lecturers while the afternoon periods were employed in practical training. (For a breakdown of a typical session, see table on page 101.) The average attendance at each session was from 40 to 80 persons, and, until the school was discontinued at the beginning of 1945, a total

of 6,400 persons had been trained. (For a breakdown of the numbers of each organization trained from 1940 through 1944, see table below).

b. *Prefectural Police and Fire Schools.* The methods for training minor leaders of police, fire, and other organizations were similar to those described in previous target reports. These schools were discontinued at the beginning of 1945.

c. *Special Comment.* The school in Nagasaki was originally established to serve the entire pre-

fecture, but in order to eliminate transportation difficulties and to make the training available to a larger number of persons, a similar school was recommended to be established at Sasebo in 1944, but lack of properly trained instructors delayed the scheduled opening date of the school until 28 February 1945. However, the building in which the school was to be located was destroyed in an air attack before that date and no further attempts were made to establish a school at Sasebo.

AIR DEFENSE SCHOOL (BOKU GAKKO)

SCHEDULE OF CLASSES AND SUBJECTS

Police, Fire, and Auxiliary Police and Fire Unit Section

Date/hours	0800-1000	1000-1200	1200-1300	1300-1500	1500-1700
1st day.....	General air defense....	Fire prevention.....	Lunch.....	Fire prevention and extinguishing.	Fire prevention and extinguishing, practical training.
2nd day.....	General air defense....	Decontamination.....	Lunch.....	Rescue and relief.....	Rescue and relief, practical training.
3d day.....	Family air defense....	Shelter construction and taking cover.	Lunch.....	Light control.....	Shelter construction and taking cover, practical training.

Factory Defense Units and Air-Defense Section of Block Association.

Date	0800-0900	0900-1000	1000-1100	1100-1200	1200-1300	1300-1400	1400-1500	1500-1700
4th day	Family air defense.	Light control.	Decontamination, rescue and relief.	Shelter construction and taking cover.	Lunch.....	Fire prevention and extinguishing.	Recue and relief, practical training.	Fire prevention and extinguishing, practical training.

AIR DEFENSE SCHOOL (BOKU GAKKO)

Classification and Number of Attendants 1940 to 1945

Year	Police-men	Fire-fighters	Auxiliary police and fire unit	Factory defense unit	Block Ass'n., air-defense crew	Total
1940....	80		156		95	331
1941....	95		350	40	350	835
1942....	110		420	50	600	1,180
1943....	120	180	600	80	1,200	2,180
1944....	80	100	680	55	950	1,865
1945.....						
Total...	485	280	2,206	225	3,195	6,391

TRAINING OF THE PUBLIC

1. *Introduction.* The purpose of this section is to describe the methods employed for disseminating civilian defense information and for edu-

cating the general public in air-raid-protection duties.

2. *Methods of Disseminating Information.*

a. *Pamphlets.* The principal method used to inform the public about general air-raid-protection duties was through the medium of pamphlets published by the Great Japan Air-Defense Association. The plan of distribution was for the leaders of neighborhood groups to display the pamphlets at meetings of their organizations and then the members would request the pamphlets desired. These requests were then forwarded to the secretary of the Nagasaki branch who obtained the pamphlets from the national headquarters. Distribution of the pamphlets was made each month. Investigations disclosed that 2,000 requests were filled each month until the printing headquarters in Tokyo was destroyed in a raid in early 1945. In Nagasaki individuals were compelled to pay

30 sen for each pamphlet, whereas in those cities where the branches of the Great Japan Air-Defense Association were in better financial condition, no charge was made.

b. *Radio and Press.* The radio was never used to present civilian defense material to the public. The only interest displayed by the press was an occasional editorial decrying the lack of interest by the general public.

c. *Motion Pictures.* The use of motion pictures was limited to two occasions, one to which the public was admitted without charge, while a charge of 10 sen was levied on the other occasion. The pictures demonstrated only the suggested methods for extinguishing incendiary bombs.

General Comments

3. Practice air-raid drills were conducted twice each year, but training officials of Nagasaki stated that they were of little value because of the uncooperative attitude of the public, and poor leadership, combined with a desire to display authority, on the part of civilian defense officials.

4. Particular emphasis was placed upon training in extinguishment of incendiary bombs.

5. Officials stated that, considering the amount and quality of available equipment and the types and periods of training undergone, the civilian defense units performed creditably under conditions created by the atomic bomb.

VIII. REFERENCE ITEMS

The reference material listed below is on file in the office of G-2, United States Strategic Bombing Survey.

Reference
(item No.)

1. Blueprint map of Nagasaki, showing the following: area destroyed or burned by atomic bomb, 9 August 1945; burned-out areas; partially destroyed or damaged areas; areas damaged by air raids of 11 August 1944, 26 April, 29 July, 31 July, 1 August 1945.
2. Map of Nagasaki City, showing location and range of each air-raid-warning siren. Solid lines indicate the range during the daytime, and dotted lines, the range during the night.
3. Japanese document, data on Nagasaki water system. Sources of water; method of intake; drainage area; effective capacity; daily mean of intake. Filter beds: type; number and area of basins; effective daily maximum of filtration. Clean water reservoirs: number of basins; capacities; size of main pipes. Number of hydrants.
4. Map showing locations of fire battalion stations (headquarters), of substations, and auxiliary police and fire units.
5. Data on Nagasaki fire department, including history, districts, equipment, facilities, personnel, and information concerning auxiliary police and fire units (Keibodan).
6. Map of Nagasaki water department system.
7. Map of Nagasaki City, showing locations of large and small water tanks (static supply) and site of dam-up.
8. Map of and report of survey on demolished houses in the cities of Nagasaki prefecture.
9. Map of Nagasaki City, showing areas demolished for fire breaks in November 1944; April 1945; and July 1945.
10. Chart of volunteer air-defense organization, Kawanami Shipbuilding Company; blueprint plan of plant layout. Exhibit C.
11. Mitsubishi Heavy Industries, Nagasaki Shipbuilding and Engine Works. Chart showing organization of special protective unit; table showing distribution and strength of air-defense units within plant; sketch of layout of control center; diagram showing alarm communications system; statement of damage suffered by plant in air raids; map of Nagasaki City; blueprint map showing locations of hydrants, water and gas lines, pumping stations and their capacities; blueprint chart, showing locations and capacities of shelters; blueprint chart, showing proposed underground midget submarine assembly plant; blueprint chart of completed and unfinished tunnels, intended for use as shelter and for housing machinery. Exhibit E.
12. Map of Nagasaki harbor, showing harbor and air-raid-protection installations.
13. Japanese text—Prefectural Plan for Evacuation of Persons in Nagasaki and Sasebo. Exhibit I.
14. Japanese document—Form of certificate of evacuation status.
15. Japanese document—Form of application for removal.
16. Japanese document—Form of report of completion of removal.
17. Japanese document—Form of sufferer's certificate.
18. Japanese text—Distribution and cooking of emergency food supply. Exhibit L.
19. Japanese text—Summary of War Casualty Insurance. Exhibit M.
20. Japanese text—Prefectural record of payment under War Service Allowance Law. Exhibit N.
21. Japanese text—Application for payment of claim for pension and allowance under wartime disaster protection plan. Exhibit O.

EXHIBIT A

List Giving Location of the 11 Sirens in Nagasaki, Showing Horsepower and Range of Each

The following is a list of the sirens by which the City of Nagasaki was warned. The numbers opposite each siren represent its location in the City of Nagasaki as shown on the map of Nagasaki, Reference Item 2, submitted with this report.

Location	Horse-power	Radii of coverage of sirens in kilometers		Installed by—
		Day-time	Night-time	
City Office:				
(1).....	20	3.5	4.5	Nagasaki City.
(2).....	1.5	1.0	1.5	Do.
(3).....	5	2.0	3.0	Do.
(4).....	2	1.0	1.5	Do.
(5).....	7.5	2.5	3.0	Do.
(6).....	10	3.5	4.0	Do.
Garrison Headquarters:				
(7).....	14	3.0	3.5	Do.
(8).....	10	3.5	4.0	Mitsubishi Ordnance plant.
(9).....	10	3.0	3.5	Mitsubishi Steel Co.
(10).....	10	3.0	3.5	Mitsubishi Shipyards.
(11).....	10	3.0	3.5	Do.

EXHIBIT B

List of Officials Interviewed in Nagasaki City

1. Fujimoto, Soshiro: Present chief of the Nagasaki fire department.
2. Yoshii, Banshiro: Second chief of the Nagasaki fire department. Present chief of the Hirado police station.
3. Ishimatsu, Yatsuki: First chief of the Nagasaki fire department. Retired.
4. Yamaguchi, Nobue: Chief of the Nagasaki water police department.
5. Furuse, C.: Chief of the Nagasaki water department.

EXHIBIT C

Report on Study Made of the Kawanami Ship Building, Ltd., Nagasaki (Reference Item 9)

1. *Introduction.* a. *Name.* Kawanami Shipbuilding, Ltd.

b. *Ownership.* Kawanami is a limited corporation valued at 50,000,000 yen, and has 4,000 stockholders. It is part of the Kawanami chain and Mr. Kawanami, president of the organization, is the heavy stockholder in the corporation.

c. *Address.* Nagasaki Ken, Nishi Songi Gun-Fukahori Mura.

d. *General Manager.* Mr. Yoshida was the general manager of the corporation and one of the individuals interviewed.

e. *Area.* Ground area was 2,160,000 square feet, which included 1,080,000 square feet building floor space.

f. *Departments.* The organization was divided into 25 departments.

g. *Buildings.* Buildings included brick, wood and concrete construction; however, many of the wooden buildings were originally torn down to make fire breaks.

h. *Principal War Production.* This plant was engaged in producing small freighters of approximately 1,500 tons displacement, and it produced an average of six and one-half ships per month, with a one-time peak of eight and one-half ships in a month.

i. *Post-War Prospects.* This plant was built for war-time use and was not in operation before the war. Present plans, however, contemplate taking on repair construction for a period and later the resumption of shipbuilding in the 1,500 ton class.

j. *Raw Stocks.* Raw stocks, plates and shapes were acquired from the Yawata Rolling Mills and were stored in the plant area and adjacent warehouse space. Critical or combustible stocks were placed in tunnels, in recessed space in the plant floor and behind concrete or steel baffles. Engines and boilers were stored in the open yard with no protection whatsoever.

k. In the period from 6 September 1943 to 7 June 1945 this little plant launched 154 ships.

1. *Control and Responsibility.* This plant was privately owned, government controlled, and was part of the chain administered by Kawanami

whose career resembled in many respects that of Henry J. Kaiser.

m. This yard was far smaller than Mitsubishi Yard, made a better record than they during the war, and plans were made for mass production. The main assembly line was down the center and accommodated six ships in what was literally a small drydock. Subassemblies were constructed in the wings on each side of the dock and were carried into position by overhead cranes. Minor assemblies were either built in the small adjoining plant area or purchased ready built, as in the case of the boilers and engines, and shipped in by ship or train. Dependence on rail and water transportation crippled this plant seriously before the advent of the atomic bomb. The atomic bomb stopped it entirely. From March until the end of the war supplies were almost nonexistent.

2. *Organization.* The general manager headed the volunteer air defense unit (Bokujiyu Tai) and was assisted by two vice chiefs. Included in the headquarters section were a headquarters staff, general affairs squad, provisioning squad, and headquarters messengers. Under the headquarters were six units, making up the balance of the air-raid-protection unit. These included a suicide unit, volunteer air-defense unit, reserve volunteer unit, two repair units, and a medical unit.

a. *Duties of Units in Headquarters Section.*

(1) *The headquarters staff* was charged with liaison between the headquarters section and the various plant sections.

(2) *The general affairs squad* was the police and administrative body of the air-raid-protection organization.

(3) *Provisioning Squad* handled the issuance of food at the plant in the event of an air-raid or in protracted periods of alarm status, where it was necessary for people to remain in shelters.

(4) *The messenger squad* consisted of 20 people and did the actual carrying of messages from the headquarters section.

b. *The Suicide Unit (Kesshitai).* This section was composed of 20 groups of three men each and it was their duty to remain at their concrete lookout posts and report the position of bomb hits in

the event of attack. These pillboxes were not equipped with telephones.

c. *Air Defense.* The air-defense unit was composed of five squadrons, each of which was subdivided into three platoons, as follows:

(1) *Fire Platoon.* This platoon was composed of 15 men who were charged with fire fighting, and were volunteer units recruited from plant personnel. Other than good health and a strong physique, no other qualifications were necessary and no extra pay was granted for this duty. A full-time instructor was maintained as the chief; he conducted classes three times during the war. The classes at these instruction periods were of 1-hour duration each and covered handling of poles, ladders, hand pumps, and fire-fighting technique.

(2) *Demolition Platoon.* This platoon was composed of 12 trained men whose general duties were to tear down buildings or wreckage which were inimical to progress of plant operations and to make repairs.

(3) *First-Aid Platoon.* As in the previous platoon, this unit was composed of 12 men. They were equipped with 40 stretchers and throughout the war received a total of two hours training in the performance of their duties which consisted of handling the injured and methods of stretcher transportation. They were not instructed in first-aid.

d. *Medical Unit (Chiryotai).* This unit was staffed with personnel from the plant hospital and included two doctors, 18 registered nurses and 20 stretcher bearers, composed of one pharmacist chief and 19 assistants. The duties of this section were to move hospital patients to tunnels upon receipt of an air-raid alarm and to set up casualty stations there. The tunnel shelter had a complete operating room and X-ray equipment, plus necessary medical supplies to handle major and minor injuries. The plant hospital had ten beds, one operating room, one surgical and one medical treatment room. The hospital also was completely equipped and did not depend upon the medical equipment in the tunnels for medical work.

e. *Reserve.* The reserve volunteer unit was in every respect identical with the previously discussed volunteer unit. In actual practice this unit was not called upon.

f. *Repair Unit.* There were two repair units, Nos. 1 and 2, which were geographical in charac-

ter and included 40 to 60 men, respectively. These men had no training and no special equipment with which to carry out their duties, which were to repair whatever damage might be inflicted by an air-raid. There was no independent plant maintenance department to offer guidance or to assist them.

3. *Shelters.* This plant was well equipped with an intricate system of tunnels which would accommodate 3,500 persons in one system and 2,000 in another. These tunnels were cut in a nearby hill, which was well over 300 feet high, and each was equipped with blast doors and had a right \perp turn near the entrance. They were equipped with individual lighting systems and complete casualty and first-aid stations, as previously mentioned. Although the shelters were not gasproof, they could be considered adequate against a normal attack and were above the average found in many other plants in Japan. The cost of one section was 315,000 yen and took over five months to build. The cost was borne entirely by the company. It was the policy to move women and hospital cases to shelter on the air alert and the remainder of the plant personnel upon receipt of the air alarm.

4. *Air-Raid Warning.* The first warning of an impending raid was received at the plant control center directly from Nagasaki fortress. The air alert signal was then relayed throughout the plant by use of hand bell stations which were in hearing distance of each other. The alert bell signal, which consisted of two rings, was supplemented by the raising of a white flag, the air alarm signal was indicated by five rings and the hoisting of a red flag. Ordinary radio warnings were also received. No siren or other signal was used. Although the siren in an adjacent plant could be heard it was not depended upon for warning.

5. *Control Center.* This was placed in a cave in the nearby mountain. It was equipped with telephone and radio. The center was 36 by nine by six feet and generally housed the entire headquarters staff during a raid. Its structure was not adequate, however, because normal seepage so softened the roofing structure it caved in of its own weight, September 1945.

6. *Water Supply.* The main water supply was in a 336,000 gallon reservoir, which had a head of 75 feet. This water was piped to the plant yard through a 4-inch pipe. The water system included 15 hydrants, but most were unusable due to low pressure caused by obstructions in the

pipes. In fact, the general manager stated that his pipe system had not been used for fire-fighting services during the war for this reason. Pressure at the base of the reservoir pipe was approximately 35 pounds per square inch and threw a 30-foot stream through a three-quarter inch nozzle. There were two sea-water static tanks in the plants, but insufficient pumps and hose to use them.

7. *Protective Equipment.* Fire equipment included six hand pumps of 120-gallon capacity; four gasoline pumps, two of which would operate, were available in the plant compound, but belonged to neighboring volunteer police and fire units (Keibodan). Capacity of these pumps were: two of 450 g. p. m. and two of 150 g. p. m., and hose available included 33-65-foot sections of two inch and 15-65-foot sections of two and one-half inch hose. Additional fire equipment included 40 beaters, 100 mats, 100 sand boxes, 60 hooks, 10 ladders, 500 shovels, and 500 buckets. The equipment available was definitely insufficient to protect the plant, even against normal fires. The manager knew this and was apologetic concerning his equipment, but said he was unable to obtain more.

8. *Dispersal.* Ninety percent of all machine tools were either dispersed or protected in some manner. About 60 percent of the machine tool equipment was in tunnels on a nearby island in the bay, another 20 percent was in nearby buildings away from the main plant; and the remaining 10 percent, which included massive machines, were either sunk below floor level or were protected by concrete or steel baffles. Dispersal was started in May 1945, one month before the government order which came out in June 1945.

9. *Mutual Aid.* A little assistance could be expected from local auxiliary police and fire units, but not in sufficient quantity to be of any value. As previously mentioned, the nearby auxiliary police and fire unit gasoline pumpers were kept near the entrance of the plant.

10. *Protective Lighting and Camouflage.* Lighting was controlled by a switch at the main transformer and office buildings were equipped with blackout curtains.

11. *Comments.* Kawanami Ship Building Plant was of an unusual type for Japan. The assembly line, which was in the factory proper, was actually a long narrow drydock. While this dock was not camouflaged, the general geographical setting and configuration of the plant was such as to be a successful disguise to the extent of concealing the nature of the establishment. The production line was open to aerial photography, due to the fact that the plant personnel had removed the wooden roof as a fire hazard. The roof was considered a fire hazard because the plant had insufficient fire-fighting equipment to extinguish flames on the roof. Although the plant was never a direct target of an air-raid and never did sustain any damage, it is estimated that it would have been completely helpless in the event of attack. On five different occasions the plant manager voluntarily emphasized that the plans which they had were "paper plans," and without the equipment to back them up they were worthless. He further stated that the general rule at the time of raids was to head for shelter and leave the plant to its fate. He further stated that the only reason they had "paper plans" was to meet the requirements of laws requiring them.

EXHIBIT D

Report on Study Made of the Mitsubishi Heavy Industries, Heavy Torpedo Works, Nagasaki. Five illustrations.

1. *Introduction.* A detailed plant protection study of the Mitsubishi Torpedo Works at Nagasaki was not undertaken, but detailed examination was made of the underground dispersal plant of this factory in the nearby hills, some 1,000 yards from the main factory buildings. Six specially constructed tunnels, housing some of the heavy machine tool operations of the torpedo assembly department, proved to be very effective against damage caused by the atomic bomb explosion. The approximate location of these tunnels with respect to the zero point of the bomb blast is shown on the map included as part of this exhibit. From appearance of the machine tools and general working conditions found within the tunnels, this plant was in the process of getting organized and established after the completion date of February, 1945, and did not actually assume its full production capacity by the time the war terminated. However, this operation is a typical example of the Japanese plan for dispersal of vital war industries undertaken by the Ministry of Munitions at a date too late in the progress of the war to be fully effective against crippling raids on their production facilities.

2. *Underground Dispersal.* The main plants of the Mitsubishi Heavy Torpedo Works were located approximately 1,000 yards on the opposite slope of one of the foothills of the mountains at Nagasaki from the site selected for the underground dispersal of the machine tool operations of the torpedo assembly plant. Six large tunnels, as hereinafter described, were bored into the side of the mountain, in which it was obviously intended to house all of the power and machine tool operations of the plant. Construction of the tunnels began during August of 1944, with about 50 percent of the program being fully completed and ready for occupancy by February of 1945. Space for the accommodation of 25 percent additional machine tool operations was available at the termination of the war, 15 August 1945, the remainder of the program being abandoned after that date. According to the spacing of the machine operations in the underground tunnels it is estimated that facilities were available to employ

at least 2,500 operators of lathes, drill presses, reamers, shapers, punches, die-making machines, machine threading tools, buffers, and other finishing devices.

3. *Tunnel Construction.* Six parallel tunnels were bored through a mountain foothill, the base of which was 1,115 feet (340 meters), with one lateral tunnel connecting all six, bored midway and at right angles to the parallel tunnels. The borings were 9 feet 9 inches in height by 14½ feet in width through solid rock and the interior of the tunnels that were completed were encased with approximately 6 inches of finished concrete. (Photo 1) The entrances of the tunnels at either end of the horizontal shaft were protected by heavy wooden doors, built of 4-inch by 4-inch material, with some attempt made to apply camouflage painting (Photo 2) to blend with the color of the surrounding terrain. No heating devices were provided for the tunnels and the only ventilation possible was through openings at either end of the borings. It was apparently contemplated to construct heavy baffles to protect the entrances, one such baffle having been erected prior to the cessation of hostilities, which was 18 feet long at the base by 4 feet in width by 15 feet in height and battered to a 2-foot finish at the top, constructed of heavy timber filled with crushed stone and earth.

Power Supply. Power for the operation of the plant was secured from the Nagasaki City power supply and distributed through four large transformers located within 100 feet of a tunnel entrance and completely unprotected against bomb blast or weather.

Water Supply. Water was supplied to each of the tunnel operations from a reservoir located at the top of the nearby mountain and transmitted through a 6-inch steel pipe with 4-inch laterals running into each tunnel from the supply main controlled by gate valves, all of which pipe was laid on the exposed surface of the ground.

4. *Manufacturing Processes.* Raw steel, bronze, and aluminum alloy castings were supplied to this operation, at which point such finished products as pistons, connecting rods, wrist pins, valve

tappets and many small torpedo assembly parts were machined and finished. (Photos 3 and 4.)

5. *Effect of the Atomic Bomb.* At the time of the explosion of the atomic bomb at 1102 hours on 9 August 1945, those portions of the underground operations completed and installed with machine tools were in complete operation. It is reliably reported that no lives were lost or injuries sustained by employees, the only damage incurred

being at the tunnel entrances where three of the six doors were partially pushed in and shattered by the impact of the bomb blast. These tunnel shelters indeed offered adequate and complete protection to both personnel and machine tool operations against the terrific blast effect of the atomic bomb, especially in view of the proximity of this underground plant to the zero point of the atomic bomb explosion.

713677-47-9



Photo 1.



Photo 2.



Photo 3.

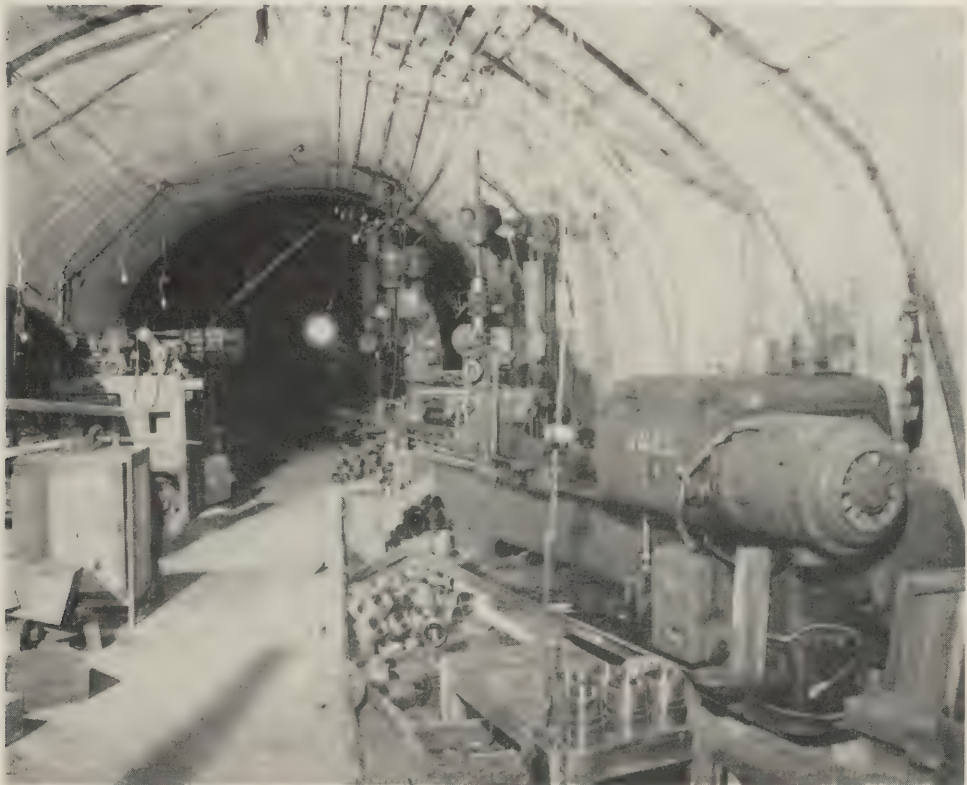


Photo 4.



Photo 5.

EXHIBIT E

Report on Study Made of the Mitsubishi Heavy Industries, Nagasaki Shipbuilding and Engine Works (Reference Item 11)

1. *Introduction.* Mitsubishi Heavy Industries, Ltd., Nagasaki Shipbuilding and Engine Branch, is located on the west side of Nagasaki harbor.

a. *Address.* No. 1, Akunora Machi, Nagasaki City.

b. *Area.* 526,937 square meters.

c. *Number of Departments.* There are 14 departments which include general affairs, business affairs, ship design, ship building, engine design, engineering, electrical, inspection, technical research, traffic, ship equipment, labor, building and maintenance and the hospital. It is well to point out that the departments or branches of this organization were larger than departments of most establishments; in fact, a department in Mitsubishi was as large as a whole plant, and some of them included as many as 4,000 or 5,000 people. In reality then, the study of the air-raid-protection organization covers several plants.

d. *Personnel.* The Mitsubishi Shipbuilding and Engine Works employed over 25,000 people.

e. *Building Construction.* The plant had in all 452 buildings, the area of which is shown below:

	<i>Square Meters</i>
(1) Concrete and steel	189,000
(2) Wood	936,000
(3) Structural steel	1,260,000
(4) Brick	207,000

It is interesting to point out that originally 14 percent of the buildings were of wood but after the removal of some of them to form fire breaks there were less than 5 percent.

f. *Principal War Products.* This organization produced 10 percent of all the shipping of Japan, including coast defense ships, 5-man submarines, torpedo boats, marine boilers, turbine and Diesel engines and oil tankers of the 10,000-ton class.

g. *Principal Peacetime Production* included battleships, passenger and cargo ships, cargo ships, marine boilers, turbines, and Diesel engines. At the present time, Mitsubishi has a go-ahead schedule to finish such tankers as she had in process and to outfit 2 freighters which had reached that stage of completion.

h. *Raw Stocks.* An attempt was made to store raw stocks in accordance with their in-

flammability, explosive nature and combustibility. Gasoline, gunpowder, and explosive and inflammable compounds, such as paints and varnishes, were stored in bombproof tunnels which were dug in the side of an adjoining mountain. These tunnels were reinforced with concrete and steel, had the entrances baffled, and, in many cases, included right-angle turns to prevent blast damage in the event of a nearby explosion. Aluminum, bronze, tool steel, nickel steel, and tungsten were stored in nearby warehouses and such materials as gum and lumber were given outside storage.

i. Mitsubishi's output before and during the war included:

Merchant vessels	Before war		During war	
	Number	Total tonnage	Number	Total tonnage
Passenger and cargo	87	601,000	6	67,000
Cargo	86	474,000	3	21,000
Oil tanker	10	94,000	33	292,000
Others	46	28,000	1	250
Grand total	229	1,197,000	43	380,250

Warships ¹	Before war	During war
Battleship	2	1
Aircraft carrier	0	3
Cruiser	11	0
Destroyer	25	5
Submarine depot ship	2	0
Special service ship	1	2
Coast defense ship	0	31
Submarine	0	3
Grand total	41	45

¹Tonnages of this class of vessels not secured.

j. This plant was privately owned by the Mitsubishi Company and was operated by that company, but was under the direct control of the Japanese government.

2. *Control and Responsibility.* Mitsubishi Shipbuilding and Engine Works looked to the Munitions Ministry for guidance and instructions on matters of air-raid protection, but also received a certain amount of assistance and direction from the local prefectural government. Management was made directly responsible for air-raid-protection of the plant and carried out this

responsibility and control through an organization referred to as "special air-raid-protection organization" (Tokosetsu Bogodan). The management was vitally interested in air-raid protection, went to great lengths and took extensive precautions to protect their factory, and, in this connection, made the general manager of the plant the titular leader of the air-raid-protection unit. He, however, passed on responsibility for direct control of the administration to the manager of the general affairs department.

3. *Organization.* The air-raid-protection unit (Bogodan) had a branch (Shibu) in each of its nine departments. Each department was divided into sub-units called (Bundans) and each of these sub-units was divided into four squads (Hans). There were 42 units in the plant and the four squads were usually referred to as the general affairs squad (30 people), guard squad (80 people), fire squad (75 people), first-aid squad (60 people) and the repair squad (75 people). (Reference Item 11.)

a. *General Affairs.* The general affairs squads kept records and did other general administrative duties. They acted as a liaison arm forming a part of the air-raid-warning net by relaying alarms and, in addition, took care of the feeding of personnel during the night shift when the regular feeding department was inoperative.

b. *Guard Squad.* The guard squads were normally composed of 80 men who were chosen for their strong bodies and generally good health. Their duties were to act as watchers, criers and to preserve order, as well as minister to those stricken in the event of gas attack.

(1) As watchers they acted both as fire watchers and aircraft spotters. The former duties were performed in small concrete pill-boxes, many of which were stationed throughout the plant, and as aircraft spotters their duty was to take station at the top of the hills behind the plant and call in the information by phone as it became available. Further duties required that the guard department act as liaison, as well as to assist the fire department in the event it became confronted with a situation which necessitated reserves.

(2) Training was conducted five times a month by the army and included instruction in such subjects as aircraft spotting and recognition, as well as gas and fire protection measures.

(3) Equipment included several pairs of binoculars and 10,000 gas masks, but it is of interest to point out that the personnel of the plant did not know how to use the masks and no classes were conducted on this subject.

c. *Fire-Fighting Squad.* The fire squads were recruited from among the plant personnel and the only requirements laid down were that they be healthy specimens and have a strong interest in fire protection.

(1) The full-time fire department consisted of 70 personnel, and positions on this staff must have been in demand for the manager stated that there was a sizeable waiting list requesting assignment to that department. In addition to the permanent staff, each subunit included a volunteer fire department of 75 men who received their fire-fighting training from the prefectural fire department once a month in classes that lasted for three hours. Subjects covered in these lectures were the handling of incendiaries, incident control, ladder climbing and the use of the hand pump.

(2) Fire equipment included: (Paragraph 4, Protective Equipment.) It is of interest to point out in passing that the company originally ordered 1,365 hand pumps to assist in the protection of the plant, and, in spite of repeated requests to the government for help, they were never able to obtain more than 704 of the requested pumps. This shortage strongly affected their air-raid protection, and, in the end, contributed strongly to the stoppage of their plant.

(3) It is of further interest to point out that the professional fire department did not attend any particular school but did get a small amount of instruction from the prefectural fire department about once every 6 months. The experience level of the plant professional fire fighters was not as good as that of the city department and that of the city department was reputedly low.

d. *Emergency Medical Squad.* The emergency medical squads were composed of approximately 60 persons and a leader.

(1) The leaders went to the hospital approximately three times a month, attended classes of three hours each in the principles of first aid, and then returned to their squads and demonstrated to their men the points

learned at the school. The leaders required the personnel in their squads actually to perform bandaging and application of tourniquets, as well as other first-aid operations.

(2) There were three main casualty stations in the plant and these were augmented by over 1,200 stretcher stations. Stretcher stations were equipped with a stretcher, bandages, tourniquets, splints and equipment to relieve a patient in the event of gas burns. The casualty stations were staffed with seven nurses in normal times, but, during an air-raid, this staff was increased to two doctors and 13 to 15 nurses. Casualty stations were wooden buildings, were not protected in any fashion whatsoever, and, therefore, in the event of air raid, the staff took shelter and stayed there until the raid was over. Casualty stations had sufficient equipment for minor surgery such as sewing up wounds and removing glass splinters, but major operations were performed at the hospital which was on the factory grounds.

(3) The hospital was staffed with 40 regular nurses, 11 student nurses, eight student pharmacists, five practical pharmacists, and 22 doctors. Its equipment included two operating rooms, X-ray equipment, five consultation offices and 101 beds. Casualties were transported to the hospital either by truck or stretcher.

e. *Repair Squad.* Repair of the plant in the event of air-raid damage was supposed to have been handled by the plant maintenance personnel with the assistance of a volunteer repair squad. Each repair squad consisted of approximately 75 persons who were assigned in each department. In general, no repairing was done, however, due to the tremendous shortage of material.

4. *Protective Equipment.* The fire-protection equipment was better than average, but was far from sufficient to handle a plant of this tremendous size. The list of equipment included four pumpers (450 g. p. m.) mounted on truck chassis. This number of four was modified to three after the raid of 1 August 1945 due to the fact that one pumper was destroyed in the fire that followed the attack. There were 14 fixed gasoline pumpers (450 g. p. m.) and 15 fixed electric pumps (1,000 g. p. m.), six manually-drawn gasoline pumps (450 g. p. m.), five fire boats (450 g. p. m.) until the raid of 1 August 1945 when one fire boat was sunk. In addition to this equipment,

there were over 400 hydrants, 1,400 portable fire extinguishers, 180 gas coats, 10,000 gas masks, 5,000 helmets and 5,000 sand boxes. One must not be misled by this rather impressive list of equipment. There were many factors that altered the initial impression. During an extended tour of the plant, many hand extinguishers were checked and not one was in operating condition. Gasoline pumpers which remained after the raids were not stored under cover and not one of them had enough hose aboard to fight a fire. Plant personnel admitted at the time of the inspection that even in the event of a small fire they would be powerless to stop it. There is no doubt that this was true. What hose was in evidence was strewn haphazardly about the plant and was in the process of deterioration. The fact is that this deterioration had been going on before the end of the war and was slowly depleting the factory supply due to the inability to replace. Originally this supply included 40,000 feet of 2½-inch hose and 20,000 feet of 1½-inch hose. However, at the time of the inspection, it is doubtful that there were 1,000 feet of usable hose available.

5. *Water Supply.* A casual glance would lead one to believe (Reference Item 3) that the water supply would be adequate for normal or average conditions, but this was not the case. There were two main sources of water. One consisted of a fresh water supply obtained from Nagasaki water mains through a 6-inch pipe and delivered at a pressure of 35 pounds per square inch. This water was distributed throughout the plant and was stored in 8 tanks having a total capacity of 896,000 gallons. (Reference Item 7.) Seven hundred thousand gallons of this capacity was lost in the raid of 1 August 1945. In addition to the fresh water supply there were three separate systems of salt water pumps and piping, including one pump delivering 21,500 g. p. h. at 70 pounds per square inch; a second pump delivering 50,000 g. p. h. at 35 pounds per square inch; and a third pump delivering 13,000 g. p. h. at 70 pounds per square inch. This water supply was supplemented by 1,500 small static tanks containing 12 gallons each, which were distributed at various places throughout the plant. It is interesting to note that in the raid of 1 August 1945 the water pressure from the city mains was too low to use without pumpers and there was no salt water system in the area affected. Consequently, fire fighters ended up by using hand pumps and buckets. Obviously, they fought a losing battle

and the buildings in question burned. Automatic sprinklers were not in evidence in any part of the plant and most of the plant personnel were not acquainted with their value.

6. *Shelters.* There is no doubt that the most outstanding part of Mitsubishi's air-raid protection was their shelters. These were divided into three types: exterior—tunnels dug in the side of the mountain and reinforced with concrete; interior—shelters which were built under heavy machinery or shipways and shelters which were completely designed concrete and steel structures constructed inside of the plant and used in connection with watching stations.

a. Tunnel shelters were by far the most adequate and were designed to house most of the personnel, whereas the shelters under the ways and machinery were makeshift in character and were used only in the event personnel did not have time to get to hillside tunnels. The concrete and steel shelters and watching posts combined were used mainly for the members of the air-raid-protection department and great efforts were made to put concrete, boiler plate and reinforcing steel together in such a fashion as to make them impregnable.

b. As to the quality of the shelters, the tunnels could be considered adequate for anything but direct hits near their entrances. In the case of interior shelters and their incident pillboxes, these were satisfactory for anything but direct hits. In one instance, an interior shelter was struck by a 500-pound bomb and its 10 occupants were all killed. During the same raid one of the concrete watching stations was struck and six persons were killed. There were a few interior shelters which were constructed beneath the floor of large buildings. These had a capacity of approximately 20 persons, were covered with about four or five inches of steel plate and concrete, and measured five feet by seven feet by 15 feet. In general, it may be said that the shelters were adequate in number and inadequate in construction with the exception of the tunnels which afforded excellent protection.

7. *Air-Raid Warning System.* The initial air-raid warning was received by a telephone call from the Nagasaki army headquarters, as well as the local telephone office, by radio and city siren. In each case the messages were picked up by the control center which was in the basement of one of the administration buildings. The interior alarm was then transmitted to the separate

branches, departmental branches and to the people in the plant by telephone, loudspeaker, and siren, respectively. Additional warning was given inside the plant by the use of bell ringers and criers.

a. *Control Center.* The control center was located in the basement of the main administration building. Its arrangements and the character of its protection would place it in a highly satisfactory status. The normal complement of the control center was ten on ordinary days and was increased to 20 during air alerts. This center was approximately 300 square meters, was equipped with a public address system, siren switch, gas mask, telephone switchboard. Incident control was handled by the manager of each department unless the incident became catastrophic, then the manager of the plant interceded. Each separate plant had its own control center which was normally one of the watching stations, especially equipped with telephone or speaking tubes.

8. *Protective Lighting and Concealment.* Light control was handled in the normal fashion. The whole plant was equipped with blackout curtains which were highly successful at the outset but, when the material began to get old and wear out, trouble began. Cloth was not available and so the light control plan suffered accordingly. All lights could be turned off by actuating one switch which was located near the main transformer. It was pointed out that towards the end of the war many man hours were lost due to blackouts which involved the shutting off of lights entirely. Very little effort was made to camouflage the plant in general. Certain smoke stacks were painted black and three storage bins near the south part of the plant were rather effectively painted so as to blend with the surrounding scenery. But other than these instances, there was little evidence of protective concealment.

9. *Operations.* During the alert signals, the employees were instructed to continue their work and an effort was made to keep an accurate enough check on the raiders to give the people 15 minutes' time to reach the shelters. It was the policy of all workmen who were not in the air-defense units to take shelter outside of the plant. Those who were to act as guards and fire fighters stayed in the plant building shelters in order to be immediately available if and when incidents occurred. These included the fire-fighting section, guard, first-aid and all other sections involved in air-raid protection. Although there were several

raids on the plant (raid damage chart) the raid that seemed to stand out most in the minds of those interviewed was the one of 1 August 1945. On this particular day the Mitsubishi plants were visited by 2 P-51s, 2 P-38s, 28 B-25s, 42 B-24s. (Damage list.) Several lessons stand out in this particular bombing, and had the Mitsubishi personnel learned them previously, the raid of 1 August might not have been so disastrous.

a. The one thing that seemed to upset the personnel the most was that the planes came in waves, thus keeping them in their shelters until it was too late to put a stop to the blaze.

b. The power pumper near the original fire was knocked out by the first wave.

c. The road leading into the stricken area was blocked by debris and it was impossible to bring in additional pumps.

d. One fireboat was sunk and another arrived late due to the fact that the captain had been killed.

e. Water pressure was too low in the area and water had to be brought in buckets.

f. The fire was so great that it, coupled with the aforementioned difficulties in paragraphs a to d, caused the people to become so excited that all finally gave up and ran for their lives, including those who were supposed to fight the fire.

The Atomic Bomb. Although the greater portion of the Mitsubishi Shipyards were out of range of the atomic bomb, some of this plant did suffer. It is interesting to note that an air alarm was called on the morning of 9 August but was cancelled. At approximately 1100, an explosion occurred at which time the general manager of the plant (person interviewed) was standing in a door looking in the direction where the bomb fell. He reported that he saw a terrific flash of light but heard little or no sound as he was several miles from the center of impact. In view of the fact that the air alarm had been called off, all Mitsubishi personnel were at their jobs. One thousand two hundred and ninety-three persons lost their lives in the factory and a great amount of damage was done. (Damage list.) Inquiry relative to the effectiveness of the atomic bomb and methods of combating it were received with a shrug of despair. Even though the greater portion of the Mitsubishi Shipyard was undamaged by the atomic bomb, although previously damaged in other raids, what remained of the plant was stopped immediately due to shortage of per-

sonnel. People would not come to work when they did not have adequate housing.

10. *Dispersal.* Mitsubishi was very progressive and efforts to disperse and to go underground were well underway when the war ended. In fact, 5 percent of the machine tools were already underground and operations were being pushed to build more tunnels and to put whole factories underground. It was the plan to put all their materials for production in tunnels adjacent to the plant; in fact, two of the tunnels were already cut and production was in progress at the time of inspection. Other tunnels were in process of construction and many were actually in use. One tunnel in the south of Nagasaki City, a vehicular tunnel, was being used to house heavy machinery used in connection with the Mitsubishi engine plant. Other efforts at dispersal included the use of six schools, three additional vehicular tunnels, a warehouse and a distant factory. Tunnelling was started originally in October 1944, pursuant to army order, and it is certain that, had the war lasted for 6 months longer, the greater percentage of machine tools and processing equipment would have been beneath the ground.

11. *Comments.* The Mitsubishi Shipbuilding, Ltd., was an excellent example of a tremendous concern with unlimited resources and engineering personnel which tried its best with what equipment it could muster; learned from each successive raid and attempted to alter its plans accordingly; but failed in the end due to the magnitude of the attacks and the incident damage confronting them. Efforts to camouflage an installation of this size or to put its main operations underground were obviously impossible. The problem, therefore, resolved itself into dispersal, fire protection, and shelters. Dispersal and shelters were handled admirably by this organization. Fire protection seemed to be the insurmountable obstacle. The greater portion of sub-assembly work in this type of plant could be and was dispersed or placed underground, but final assembly, due to the size of the product, had, of necessity, to be brought outdoors and in the open. As the raids grew more frequent and more intense, the damage mounted in direct proportion due to the fact that each raid not only taxed the original facilities but also destroyed much of the fire-fighting equipment which was irreplaceable. In spite of the well intended efforts which the management made, the shortage of equipment,

which became progressively more acute, eventually made evident to the fire-fighting personnel, even before the advent of the atomic bomb, that plant personnel must give up. They decided there was no method of combating the raids effectively

and the general order was given to take shelter, wait until the raid was over, then try to hold the damage to a minimum. Personnel interviewed were resigned to this and felt they could do no more.

EXHIBIT F

Tables Showing Lighting Conditions in Nagasaki, and the Decrease in Lighting Due to the Application of Light Control Measures

From data supplied by Prefectural Government Engineers

COMMON STREET LIGHTING SYSTEM

Period	Number of units	Annual power consumption KWH	Average wattage per unit	Estimated daily burning hours	Remarks
1939....	900	75,600	23	10	Year ran from
1940....	900	75,600	23	10	April through
1941....	900	75,600	23	10	following March,
1942....	200	3,600	10	5	with number of
1943....	180	2,700	10	4	units as of 30
1944....	180	1,620	10	2.5	October.
1945....	100	240	10	2	April to July only.

STREET CAR COMPANY STREET LIGHTING SYSTEM

1939....	400	60,480	60	7	Year ran from
1940....	400	60,480	60	7	April through
1941....	500	75,600	60	7	following March,
1942....	420	22,680	30	5	with number of
1943....	350	18,900	30	5	units as of 30
1944....	350	11,340	30	3	October.
1945....	200	2,160	30	3	April to July only.

INDOORS

Period	Number of units	Annual power consumption, KWH	Average wattage per unit	Estimated KWH per month per customer
1939:				
Fixed.....	62,215	8,168,371	120	3.3
Metered.....	144,087			
1940:				
Fixed.....	63,189	8,323,978		3.2
Metered.....	153,240			
1941:				
Fixed.....	66,615	8,543,825		3.0
Metered.....	167,489			
1942:				
Fixed.....	65,246	8,258,946		2.9
Metered.....	172,348			
1943:				
Fixed.....	64,390	6,920,386		2.4
Metered.....	178,540			
1944:				
Fixed.....	60,512	5,630,536		1.9
Metered.....	182,874			
1945:				
Fixed.....	54,000	1,279,913		0.5
Metered.....	152,000			

¹Per lighting outlet.

NOTE—These figures include domestic load above, plus stores, home-type factories but not larger factories. There is some small power load included.

SCHOOL LIGHTING

[Estimated figures]

Period	Number of units KWH	Annual power consumption	Average wattage per unit	Per outlet
1939.....	4,000	62,000	40	1.3
1940.....	4,000	63,500	40	1.3
1941.....	4,000	65,500	40	1.4
1942.....	4,000	63,000	40	1.3
1943.....	4,000	53,000	40	1.1
1944.....	3,800	43,100	40	0.9
1945.....	3,500	12,000	40	0.3

See explanation in paragraph on Home Lighting.

GATE LIGHTS

[Remarks: The figures shown in the first column have been estimated.

Period	Number of units	Annual power consumption KWH	Average wattage per unit	Estimated KWH per month per customer
1939.....	5,000	270,000	10	4.5
1940.....	5,000	270,000	10	4.5
1941.....	3,000	79,200	10	2.2
1942.....	1,000	15,600	10	1.3
1943.....	0	0	0	
1944.....	0	0	0	
1945.....	0	0	0	

DOMESTIC POWER CONSUMPTION

1939:				
Fixed.....	59,104	6,534,696	20	13.1
Metered.....	115,245			
1940:				
Fixed.....	60,029	6,659,182	20	3.0
Metered.....	122,592			
1941:				
Fixed.....	63,264	6,835,060	20	2.9
Metered.....	133,991			
1942:				
Fixed.....	61,983	6,607,156	20	2.8
Metered.....	137,878			
1943:				
Fixed.....	61,170	5,536,284	20	2.3
Metered.....	142,832			
1944:				
Fixed.....	57,486	4,504,428	20	1.8
Metered.....	146,299			
1945:				
Fixed.....	51,300	1,023,930	20	0.5
Metered.....	121,600			

¹Almost entirely lighting load.

EXHIBIT G

Sketch of Nagasaki, Showing Locations of Certain Tunnel Shelters With Respect to the Atomic Bomb Point of Impact

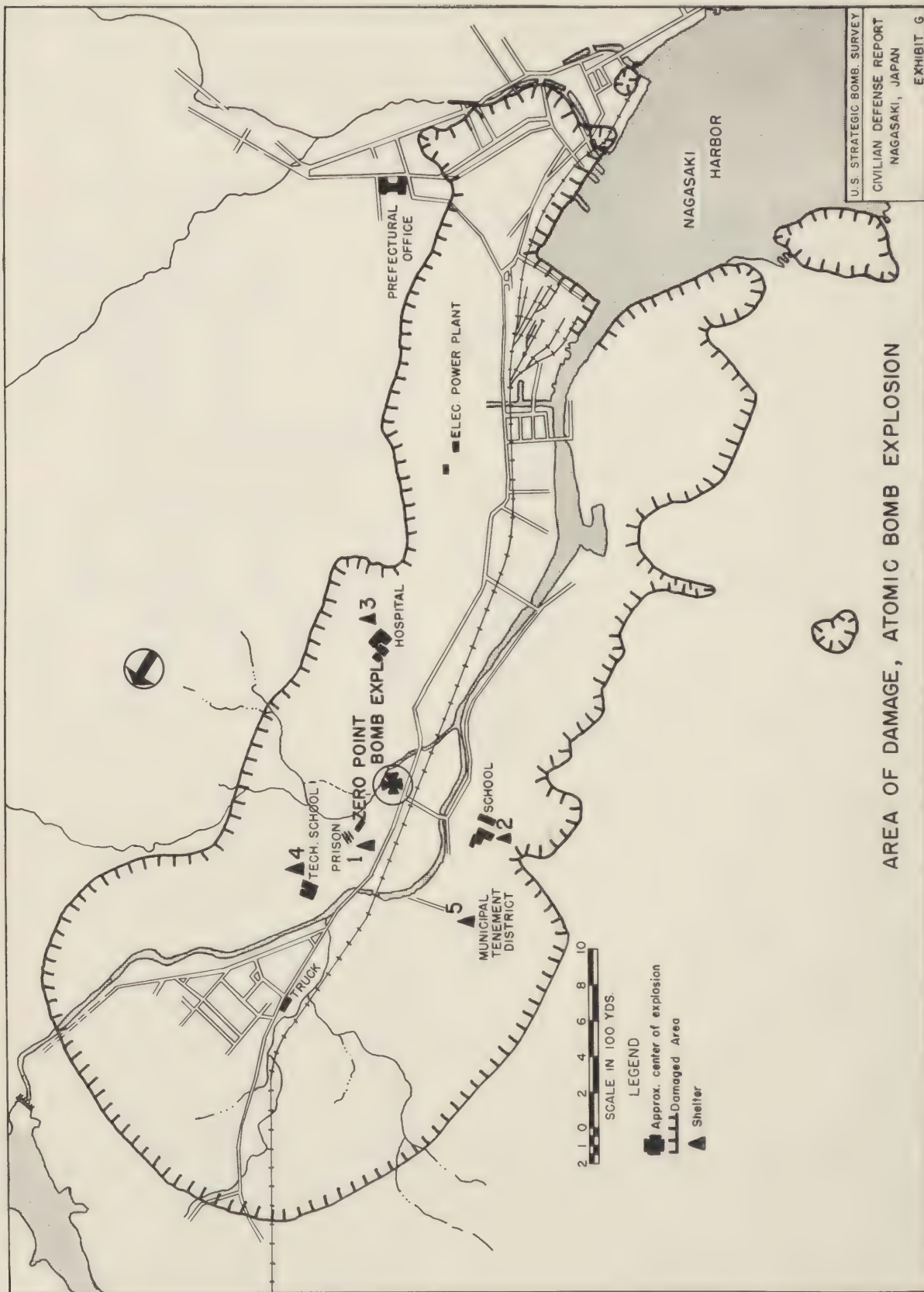


EXHIBIT H

List of Names of Persons Interviewed, Who Were in Shelters at Time of Atomic Bomb Explosion

Subject A—Kahori, Taeko. Age 16.
Subject B—Nakamura, Minoru. Age 28.
Subject C—Sashikata, Masami. Age 18.
Subject D—Katsuki, Masashi. Age 24.

Subject E—Iwasaki, Kiyoshi. Age 32.
Subject F—Uyeno, Terao. Age 44.
Subject G—Uyeno, Kikuji. Age unknown.
Subject H—Kubo, Sakitaro. Age 59.

EXHIBIT I

Translation of Prefecture Plan for the Evacuation of Persons in Nagasaki and Sasebo (Reference Item 13)

1. *Policy.* Evacuation of persons (old, young, pregnant women) to be affected in order to render Nagasaki and Sasebo cities strong in air-raid protection.

2. *Area.* Nagasaki and Sasebo cities.

3. *Main Points in Carrying Out Evacuation.*

a. *The Objects.* Residents who do not fit into the general mobilization and air-raid protection program, and others whose presence is not required (as follows), and the old, young, pregnant women and school children.

(1) Those whose business is not in these cities.

(2) Those who have no business, because of business becoming combined or disbanded.

(3) Those living on annuities, pensions, rentals, interest, allowances.

(4) Those in the city only for their children's education.

(5) Those with two residences, because of being retired or newly married.

(6) Any others whose business does not require their presence in the cities.

(7) School children below second grade of primary school.

(8) Unweaned children.

(9) Pregnant women (requiring midwife care).

(10) Aged, above 65.

(11) Necessary attendants.

b. *Policy of Persuasion:*

(1) Force is to be provided, and persuasion used to get people to evacuate to relatives.

(2) Other evacuation areas and cities important for military reasons are to be avoided in evacuation.

(3) The fact that evacuation is for the purpose of making a positive contribution to the wartime allocation of citizens for increasing the country's war potential is to be made thoroughly understood.

(4) Evacuees are to be urged to fill a necessary duty, such as work in agriculture or munitions factories, according to their ability.

c. *Methods of Persuasion:*

(1) Making an enlightened explanation to the people of the evacuation area.

(2) Such propaganda is to make the police offices and the city the pivot and to avoid arousing unrest.

(3) It should make the fundamental reasons for evacuation clear, emphasize its necessity and unify public opinion.

(4) While it should plan to afford every facility to evacuees, still it should look to the positive cooperation of the citizens and not unnecessarily give rise to a spirit of dependence.

(5) Thought should be given to not arousing any fear of air attacks nor arouse any tendency toward fleeing from difficulties.

(6) Offices, public and national bodies should strive for close cooperation and unification of leadership.

4. *Organizations for Carrying Out Evacuation.* a. In the Nagasaki prefectural office, a Nagasaki prefectural city evacuation headquarters (Nagasaki Ken Toshi Sokei Hombu) is to have charge of unifying and controlling the evacuation program.

b. A city evacuation-consultation office (Shi Sokai Sodensho) is to be established in each of Nagasaki and Sasebo cities, and a police evacuation-consultation office (Keisatsu Soka Sodensho) in each police office.

c. In the two cities an evacuation council (Sokai Kyogikai) is to be formed of officials and the secretariat of various bodies, to speed the carrying out of evacuation.

5. *Methods of Carrying Out Evacuation.* a. In the evacuation areas:

(1) A basic census of the persons who are to be the objects of evacuation is to be carried out.

(2) In the two cities, meetings for persuasion and consultation are to be held under the government auspices of the police and city authorities.

(3) Regular meetings of neighborhood groups, other meetings and organs for discus-

sion are to be used to speed the work of evacuation.

(4) The radio, newspapers, notice boards, pamphlets, etc., are to be used to spread thoroughly an atmosphere for evacuation.

b. In the reception areas.

(1) All the prefectural branch offices, local business offices, councils on reception of evacuees in cities, towns, and villages, and evacuation-consultation offices are to develop an actual spirit for the reception of evacuees, and extend the movement for affording housing.

(2) They are to carry out a movement to summon people who need to evacuate.

c. Other matters.

(1) Transportation and packing priorities are to be given special transportation rates.

(2) In cases where people must live apart because of evacuation, attention is to be given to provide housing or joint-living arrangements for those who stay behind.

(3) Payment of evacuation bonuses. Such are to be paid according to the area.

(4) Liaison with other prefectures. Letters of request will be sent to governors of prefectures concerned with reception centers, and their cooperation will be requested.

(5) Distribution of removal certificates. The mayors will distribute such certificates, according to a form indicated separately, to people who remove for evacuation purposes.

(6) Miscellaneous. Evacuation will be carried out in accordance with "General Outline for Carrying out City Evacuation" and "General Outline for Carrying out Evacuation of the Aged, the Young, Pregnant, and Others."

6. *Reference Notes.* a. Evacuation areas and designated important cities which are to be avoided in moving.

(1) Evacuation areas:

Tokyo-Yokohama area.

Western part of Tokyo City, Yokohama City, Kawasaki City.

Osaka-Kobe area.

Osaka, Kobe, Amagasaki Cities.

Nagoya City.

North Kyushu area:

Moji, Kokura, Tobata, Wakamatsu, Hachiman Cities.

(2) Other designated important cities:

In Tokyo Prefecture—Tachikawa City.

In Saitama Prefecture—Kawaguchi City.

In Kanagawa Prefecture—Yokosuke City.

In Osaka Prefecture—Sakai, Fuse Cities.

In Hyogo Prefecture—Nishinomiya, Mikasa Cities.

In Kyoto Prefecture—Kyoto and Maizuru Cities.

In Jimaguchi Prefecture—Shimonoseki City.

In Hiroshima Prefecture—Kure.

(3) Other places into which moving is controlled:

Tokyo Prefecture—Tachikawa City, Musashino Machi, Mitaka Machi, Tanashi Machi, Hodachi Machi, Showa Machi, Omuta City, Muroan City.

b. Grant of money to encourage evacuation:

Basis: (1) Families of which 35-40 percent are called to military or wartime service reserve grants.

(2) Those whose taxes are under two yen, or exempt from tax.

In Nagasaki City:

Those exempt from tax.....	700
Those paying under 1.00 yen.....	7,650
Those paying under 1.30 yen.....	3,119
Those paying under 1.70 yen.....	5,624

17,093

These two classes represent 80% of those who qualify for grants.

c. Miscellaneous.

(1) Evacuation to relatives will be the fundamental principle but conditions may require group evacuation; therefore the basic census should be made quickly and preparations formed.

(2) Opening of conference on policies for school children evacuation. School principals will hold a conference of 4 April 1945. (6 April in Sasebo).

(3) Policy for school children evacuation. All those in the primary grades. However, places on the outskirts, not greatly different from farming villages, will be excluded.

(4) The period for emphasizing evacuation to relatives will be by the middle of

May; evacuation will be carried out immediately and finished at the latest by the end of May 1945.

(5) If there is no sudden change in conditions, the policy will be carried out according to the methods outlined above.

EXHIBIT J

Translation of Articles 1 to 9, Inclusive, of the National Wartime Damage Protection Law (Senji Saigai Hogo Ho), Enacted 24 February 1942

1. *Concerning the law:*

CHAPTER 1.

ART. 1. This law compensates Japanese nationals who are injured due to wartime disasters, as well as their families and the surviving family members.

ART. 2. In this law wartime disasters shall be defined as disasters due to enemy action, as well as disasters resulting from such.

ART. 3. There are three types of compensation: (1) relief, (2) pension, and (3) allowance.

ART. 4. With respect to compensation, it shall be done by the prefectural governor of the area in which the claimant maintains his permanent residence (in case of relief, his present residence).

CHAPTER 2.

ART. 5. Relief shall be given to persons who need emergency relief immediately after meeting with some wartime disaster.

ART. 6. Types of relief are as follows:

- a. Supplying of household effects.
- b. Giving food in case of being burned out.

c. Giving and loaning of clothing, bedding and other essentials.

d. Medical and maternity expenses.

e. Giving for school supplies.

f. Funeral expenses.

g. In addition, any items deemed necessary by the prefectural governor. The prefectural governor can, in cases which he deems necessary, disburse sums of money to persons needing relief (in case of funerals to the person who performs the funerals) regardless of the provisions mentioned above. Items pertaining to the extent of the relief, the method and the length of time shall be determined by orders.

ART. 7. The prefectural governor is authorized to employ in the effecting of relief those persons designated by Imperial Edict.

ART. 8. The prefectural governor is authorized to have those persons needing relief cooperate in the effecting of relief.

ART. 9. In order to carry out relief, the prefectural governor can, in instances which he deems necessary, superintend installations, utilize property (land), houses, or commodities designated by temporary Imperial Edict, and take custody of and appropriate commodities, employing those persons as are designated by Imperial Edict.

EXHIBIT K

Translation of Articles 1 to 4, Inclusive of Official Bulletin, Extra Issue of 18 September 1942: Par- ticulars for Carrying Out the War- time Disaster Protection Law in Nagasaki Prefecture

Particulars for carrying out the Wartime Disaster Protection Law (Senji Saigai Hogo Ho) are determined as follows:

General Rule

ARTICLE 1. When anyone has received injury by reason of wartime disaster the head of city, town, or village shall immediately notify the governor of the circumstances.

Relief.

ARTICLE 2. Funds to be paid for relief shall be limited as follows:

a. Actual cost, in the case of expense for equipment of shelters. The expenses when ordinary buildings are adapted to shelters shall be 1 yen per individual for rental of rooms or houses in the case of schools, temples, public institutions, and private homes and for bedding, etc., 3 yen per individual per day for room and for three meals in the case of inns, restaurants and such business establishments.

b. Maximum of 350 yen per household in the case of payments for construction of temporary dwellings.

c. Maximum of 60 sen per individual per day in the case of payments for supply of foodstuffs such as boiled rice.

d. Maximum, as follows, in the case of payments for grants or loans of clothing or bedding:

(1) Clothing.

Winter clothing, per individual, 20 yen.

Spring and fall clothing, per individual, 14 yen.

Summer clothing, per individual, 8 yen.

(2) Bedding.

In case of grant, maximum of 65 yen.

In case of loan, actual expense.

e. Maximum of 15 yen per individual, or 45 yen per household, in the case of grants of daily

necessities, such as dishes, cooking utensils, wooden clogs, umbrella paper and towels.

f. Actual cost, in the case of medical and maternity service.

g. In the case of school supplies, actual cost for books, and a maximum of 2.50 yen per individual for stationery.

h. Maximum of 30 yen per individual for funeral expenses.

i. Actual cost of coolie hire or cartage necessary for relief. When necessary, actual cost may be paid for items in *b* to *e*, and *g* and *h*, in spite of the regulations. Granting of shelter, boiled rice and foodstuffs shall be for 15 days or less. However, according to the circumstances of the sufferer permission may be secured from the governor beforehand to extend the time, and when cash is paid for relief the governor's permission should be secured beforehand.

ARTICLE 3. Those who wish to receive relief (exclusive of boiled rice) on the basis of the regulations in Article 5 of this law should present an application in duplicate for relief according to Form 1 through the head of city, town, or village in the relief area to the governor. When the head of city, town or village receives the above application, he should prepare a note on relief according to Form 2, append any necessary documents, and dispatch it to the governor.

ARTICLE 4. When the head of city, town or village feels that conditions are urgent and that there is no time to wait for instructions from the governor in cases where there are people who have received injury by *reason of wartime disaster*, he may immediately start to carry out the establishment of shelters and the distribution of boiled rice, but these alone. When the head of city, town or village starts to carry out relief measures in accordance with the above regulations, he should immediately notify the governor to that effect and ask for his instructions on subsequent measures to be taken.

EXHIBIT L

Translation of Pamphlet: Distribution and Cooking of Emergency Food Supply, (Nagasaki) (Reference Item 18)

1. *Distribution.* a. The assurance of food supply is necessary for the public peace of mind. A speedy and sure distribution is the short road to maintenance of security.

b. The police chiefs are the key men of the program.

c. Speedy and sure distribution is in the hands of the personnel. It is necessary to eliminate anything that would interfere with the program.

d. When the air-raid warning has been ordered, the state of preparation for mobilization and transport facilities of the National Protection Food Unit (Shokuryo Kokubodan) and the Distribution Volunteer Unit (Kaikyū Teishintai) is to be ascertained and the mobile allocation is to be carried out without miscalculation in direct accordance with circumstances.

e. When the orders of the head of the Police Department for emergency distribution of food-stuffs has been received, the police chiefs will carry out the operation. However, when there is no time to receive the orders or when it is impossible to receive them, appropriate action will be planned and a report of the conditions made. A short delay will invite disaster.

f. Distribution will be carried out immediately in the following order in accord with proper judgment.

(1) For refugees grouped in some designated place, or those accommodated in reception centers.

(2) For infants without mother's milk and for such wounded and ill persons in special need of provision as the police chiefs may indicate.

(3) For air defense personnel.

(4) For those performing special service in order to provide emergency restoration of electricity, gas, water, or communications in factories or offices that have received damage from air attack.

(5) For whomever else the police chiefs consider to be in need.

g. The emergency foodstuffs and the standard amount for distribution will be in accordance

with Article 6073 of No. 18 Order of 7 August 1943.

h. The period for distribution will ordinarily be five days, unless the police chief gives special instructions, and restoration is to be made to normal distribution as speedily as possible.

i. Emergency distribution of food will be carried out by police chiefs on the basis of requests from city, town and village chiefs, but the latter may carry it out without such request when they themselves deem it necessary.

j. The command for distribution is to be given through written instructions for distribution. The necessary amount will be filled in by the police chief, the original presented to the warehouse operator or custodian, and copy sent as a report to the head of the police department.

k. List of the custodians from whom to secure rice, subsidiary foods, clothing, matches and candles and fuel.

l. Instructions about keeping accounts clear.

m. Ordinarily foods stored up for emergency will be used. If there is no such supply, it may be secured from distributors.

n. A unified plan of speedy and sure transport will be devised, the National Protection Food Unit, to carry the supplies from the storehouses to the places where it is to be cooked, and the Distribution Volunteer Unit to the distributing points.

o. Distribution of rice and subsidiary food to be carried out without confusion.

p. The National Protection Food Unit will ordinarily guard the stored foods.

q. The stored foods are to be inspected twice a month and a report made to the Chief of the Police Department.

2. *Cooking.* a. Importance of food supply to morale and activity.

b. The responsible parties and their spheres. Police and fire departments and subordinate bodies, mayors, guard and rescue units, and managers of factories and business offices.

c. The police and fire departments will see that the units connected with air defense personnel have plans already made for food distribution.

d. The preparation of food will be done by the unit assigned to this work.

e. The heads of cities, towns and villages will organize units for preparation of food (Taki-dashi Butai) and give constant supervision to see that necessary preparations are made.

f. Ordinarily preparation of food will be attended to by the chiefs of the cities, towns and villages concerned, but in case of large scale raids in Western Kyushu, neighboring towns may be called on for this service.

g. Police chiefs will carry out orders for preparation of food when instructed by the head of the police department. However, when communications are broken and there is need of haste, the police chief of the suffering area is to manage the situation.

h. The command for preparation of rice will indicate clearly the place, and include an order for releasing the supplies from the storehouses.

i. When there is an insufficient supply in co-operating towns and villages, request may be made to the head of the police department, but

when there is no time for this, temporary use may be made of supplies in the town and village storehouse to avoid hindrance to the program.

j. Dried bread is to be distributed during the first period of food preparation if it is felt that the preparation will take too long.

k. When preparation of food is carried out, an order is to be issued to the transportation organ giving definite instructions about destination and quantity.

l. Police chiefs will summon the food preparation unit when an attack is threatened and have them in readiness.

m. When the food preparation work is finished an immediate report will be given on place from which supplies were drawn, kinds and amounts and the person responsible for payments.

NOTE. These general rules are followed by charts designating the neighboring towns which are to help Nagasaki City and other cities in the prefecture in case of need, as well as the places within the cities themselves where preparation of food is to be carried out. Nine villages were designated to help Nagasaki, and 38 places within the city were designated.

EXHIBIT M

Translation of Pamphlet: Summary of War Casualty Insurance (Senso Shibo Shogai Hoken) (Reference Item 19)

This insurance covers the death or injury of any serviceman at the front, and also the death or injury of any person on the home front due to enemy air raids, antiaircraft fire, fire, fire-fighting, refugeeing, panic, or other incidents due to enemy action.

The insured. Any Japanese citizen may be insured, regardless of age, sex, occupation, and residence.

Types of war casualty insurance. Type I: Insurance for death or injury incurred within Japan proper.

Type II: Insurance for death or injury incurred within Japan proper as well as overseas. Therefore, any service man at the front, or Japanese who lives or travels abroad will need Type II insurance.

The premium. For Type I the premium is 3 yen per annum per 1,000 yen, and that of Type II is 10 yen per annum per 1,000 yen. The premium is reasonable, and the insurance period is one year; e. g., if you take out a War Casualty Policy for 3,000 yen, the premium will be 9 yen for Type I, and 30 yen for Type II. The maximum amount of insurance is 5,000 yen.

The beneficiary. The insured is usually the beneficiary, but your wife, children, parents, brothers and sisters, or any relatives whom you choose to designate at the time of application may be the beneficiary.

Application. (1) Anyone may apply. A contract made out by the insured is not necessary. Therefore, any serviceman at the front may be insured by any member of his family at home.

(2) Application for a policy may be made at any head, branch, or business office of any life or fire insurance company, or other agency handling this insurance by filling out and submitting the application form together with the premium.

(3) The insurance company will assume responsibility for one year from the day after the date on which the company accepts the application form and the premium.

(4) When there are more than 30 applicants in any office, school, company, or factory, they may apply as a group.

Payment of insurance. The full amount of the policy will be paid not only for death of the insured, but also for loss of both eyes, or both legs, or both arms. Half of the insured amount will be paid for the loss of one arm, or one leg, or total deafness. A graduated percentage of the total amount of insurance will be paid in proportion to the degree of injury.

For further details please consult the Section of Wartime Insurance in the Division of General Administration of the Ministry of Finance, or any insurance company.

EXHIBIT N

Prefectural Record of Payment Under War Service Allowance Law (Translation) (Ref- erence Item 20)

NAGASAKI

Date: 18 November 1944
From: Guard Section
To: Chief of Police Department (Nagasaki
Prefecture) (Chief of Domestic Affairs
Department).

PETITION FOR PAYMENT

Amount: 211.00 yen

For medical expense incurred under the au-
thority granted for her medical care approved un-
der the date of September 19, 1944.

Name and Address:

Komine, Chiyoko (Recipient)
Nagasaki-shi, Joko-Machi 471

Inquiry is hereby made as to whether the sum
of money mentioned above may be paid or not out
of the various funds (reserve fund, air defense
operation fund, air defense workers' relief funds)
of the 1944 budget of the Home Affairs Ministry.

Date: 4 November 1944

From: Guard Section
To: Chief of Police Department (Nagasaki
prefecture) (Chief of Domestic Affairs
Department).

Amount: 283.00 yen

For medical expenses from August 1 to Sep-
tember 11 inclusive, incurred under the authority
granted for her medical care approved under the
Air Defense Workers' Relief Act, dated 19 Sep-
tember 1944.

Name and Address:

Komine, Chiyoko (Recipient)
Nagasaki-shi, Joko-Machi 471

Inquiry is hereby made as to whether the sum
of money mentioned above may be paid or not out
of the various funds (reserve fund, air defense
operation fund, air defense workers' relief fund)
of the 1944 budget of the Home Affairs Ministry.

Guard Section #1902

Date: 6 September 1944.

From: Guard Section
To: Chief of Police Department (Nagasaki
Prefecture) (Chief of Domestic Affairs
Department).

PETITION FOR MEDICAL CARE APPROVAL

Name: Komine, Chiyoko
Date of birth: 14 June 1929
Occupation: Farmer
Address: 471 Joko-machi, Nagasaki-shi.

For the reason that the above-named person has
filed a petition attached herewith requesting that
medical care be granted her for injury caused by
an incendiary bomb while engaged in the task of
fighting the fire caused by an enemy air raid on
the 11th day of August, 1944, the undersigned
hereby makes this inquiry to ascertain whether or
not medical care as requested by the applicant
may be approved; also, whether or not an order
of approval will be issued by you.

Instruction #2

From: Chief of Police Department (Nagasaki
Prefecture).
To: Chief of Umegasaki Police Station.

Matter relative to forwarding the order of
approval for medical care.

Petition for medical care forwarded as per
Ume-Defense-Confidential dispatch No. 619 is
hereby approved and a letter of approval for med-
ical care is forwarded herewith and the same may
be delivered to the petitioner and have her apply
for payment of the cost for medical care.

Ume-Defense-Confidential dispatch #619.

CERTIFICATION OF FACTS

Name: Komine, Chiyoko
Date of birth: 14 June 1929
Occupation: Farmer
Address: 471 Joko-machi, Nagasaki-shi.

The above named person, a household fire
fighter, has received burns on her face, chest and
thigh from an incendiary bomb dropped in the
second attack while extinguishing an incendiary

bomb dropped in the first attack at her home (471 Joko-machi, Nagasaki-shi) at 0110 hours, 11 August 1944.

I hereby certify the foregoing factual statement.

2 September 1944

Chief of Umegasaki Police Station.

A REPORT PERTAINING TO MEDICAL CARE

Name: Komine, Chiyoko
Date of Birth: 14 June 1929
Occupation: Farmer
Address: 471 Joko-machi, Nagasaki-shi.
From: Komine, Chiyoko
To: Mr. Tanaka, Shigeyaki, Governor of Nagasaki Prefecture.
Date: 2 September 1944.

I hereby petition, by submitting necessary papers attached herewith, to receive your acknowledgment of the fact that I have received injuries from an incendiary bomb dropped in the second attack while extinguishing a bomb dropped in the first attack at my home (471 Joko-machi, Nagasaki-shi) at 0110 hours, 11 August 1944. The treatment of these injuries has already been started.

PHYSICIAN'S DIAGNOSTIC STATEMENT

Name: Komine, Chiyoko
Age: 16 years old

1. Nature of injury. Burns all over the body.

1. Extent of injuries:

(a) Second degree burns of face, right cheek, hips, neck and chest.

(b) Second to third degree burns of both arms except the inside of the right upper arm.

(c) Second to third degree burns extending from left frontal portion of elbow to back of the hand and to all fingers.

(d) Second to third degree burns of left and right thigh.

1. Condition: Upon admittance to the hospital, all areas of burns were treated, sterilized, dried and bandaged and her general condition is good.

1. The patient should be confined and treated in the hospital for about 10 days.

I hereby diagnose this case as above stated.

August 31. Seijiro Kuwasaki, M. D.

Kuwasaki Surgical and Skin Disease Hospital,
6 Enotsu-cho, City of Nagasaki.

(Tel. 1091)

Ume-Defense-Confidential Dispatch #682

Date: 29 September 1944

From: Chief of Umekazaki Police Station

To: Chief of Police Department of Nagasaki Prefecture.

IN RE: DEMAND FOR MEDICAL EXPENSE

Name: Komine, Chiyoko
Address: 471 Joko-machi, City of Nagasaki
Occupation: Farmer
Date of birth: 14 June 1929.

The above named person whose medical care was authorized by a written order, Guard Section No. 1902, dated the 19th day of September 1944, is making a demand for the payment of medical expense accordingly, submitting all necessary papers herewith; an investigation of this case was made by virtue of the authority granted by a provision of Section 36 of the Nagasaki Prefectural Directive, dated July 21, 1942 and subsection 1 of Section 3 of the regulation pertaining to the payment of relief fund to persons engaged in air defense (work) and I beg to submit the finding of the fact of this case together with documents supporting it attached herewith.

FACTS

(1) No fact was found which prevents the applicant from receiving the benefit under the provision of No. 1, Section 1, Article 4 of the relief decree.

(2) Statement in detail as to the period of hospitalization, method of treatment of ailment from the time of first injury to full recovery of it:

The case being that of second and third degree burns caused by the spray of oily substance of an oil incendiary bomb, a considerable difficulty in treatment was encountered at first because of unsanitary conditions combined with perspiration in the locality of the burn, but improvement thereafter was satisfactory because there was no further infection. It is estimated that full recovery can be made in about one and one-half months (by the middle of November).

The patient was given one venous injection daily at the time of medication and one dose of hypodermic injection once every four days.

(3) Are the statements of the physician in charge, and other details of the treatment true and was there no discrepancy found in them?

In this case, the medical society was consulted and the applicant was examined; we found that

the statements are true and there is no discrepancy in them.

(4) Was the period of treatment unduly long?

This case, being that of a major burn, is not

curable in a short period. Although 40 days have already been spent to this day (September 20) it is believed that about one and one-half months of additional time will easily be required.

(5) Other matters for reference: None.

EXHIBIT O

Application (Translation) for Payment of Claim for Pension and Allowance Under Wartime Disaster Protection Plan (Senji Saigai Hogo Ho) (Reference Item 21)

- I. Name of Claimant _____
Place of Registry _____
Address _____
- II. Direct Cause of Injury (Check one):
(a) Air attack _____
(b) Attack by enemy ships _____
(c) Other wartime disasters _____
- III. Nature of Damage, Injury, or Loss:
(a) No. persons killed _____, injured _____
(b) Houses burned or damaged: completely _____, half _____, partially _____
(c) Household effects burned or damaged: completely _____, half _____, partially _____
- IV. 1. Are you entitled to receive special grants on the basis of regulations covering persons killed (Tokubetsu Shikin Shiyo Kitei), as an employee of the Army or as a workman employed by the Army? Yes _____ No _____
2. Are you receiving special grants as a government official? Yes _____ No _____
3. Are you receiving grants under the law covering crews of ships (Senin Doin Rei)? Yes _____ No _____
4. Are you receiving compensation under War Service Allowance Law (Boku Jujisha Fujorei)? Yes _____ No _____
5. Does your annual income exceed 7000 yen? Yes _____ No _____
6. Does your independent income exceed 3000 yen? Yes _____ No _____
7. Amount of War Damage Insurance (Senso Hoken) on
(a) House _____,
Name of Company _____

(b) Household effects _____,
Name of Company _____

8. Is it your own house (including house boat), or in the case of houses which belong to people who died in a wartime disaster, does owner or that family live in it? Yes _____ No _____

- V. Data regarding members of the household, i. e., persons registered in the same family register, including wife living elsewhere, those drafted into service, those evacuated, and those mobilized for labor purposes who may not be actually living in the same household.

Name	Order of succession	Date of birth	Occupation

Monthly salary	Extent of injuries (or death)

Do not fill in below here.

- VI. Statement of proof in case of ownership, of injuries, of death.
- VII. Matters concerned with this claim, including reason for making claim.
- VIII. Notarized by block association chief, village association, mayor, or village chief.
- IX. The claimant will submit documents necessary to support this claim.

From the Governor of Nagasaki Prefecture.

UNITED STATES STRATEGIC BOMBING SURVEY

LIST OF REPORTS

The following is a bibliography of reports resulting from the Survey's studies of the European and Pacific wars. Those reports marked with an asterisk (*) may be purchased from the Superintendent of Documents at the Government Printing Office, Washington, D. C.

European War

OFFICE OF THE CHAIRMAN

- *1 The United States Strategic Bombing Survey: Summary Report (European War)
- *2 The United States Strategic Bombing Survey: Over-all Report (European War)
- *3 The Effects of Strategic Bombing on the German War Economy

AIRCRAFT DIVISION

(By Division and Branch)

- *4 Aircraft Division Industry Report
- 5 Inspection Visits to Various Targets (Special Report)

Airframes Branch

- 6 Junkers Aircraft and Aero Engine Works, Dessau, Germany
- 7 Erla Maschinenwerke G m b H, Heiterblick, Germany
- 8 A T G Maschinenbau, G m b H, Leipzig (Mockau), Germany
- 9 Gothaer Waggonfabrik, A G, Gotha, Germany
- 10 Focke Wulf Aircraft Plant, Bremen, Germany
- 11 Messerschmitt A G, Augsburg, Germany
 - Over-all Report
 - Part A
 - Part B
 - Appendices I, II, III
- 12 Dornier Works, Friedrichshafen & Munich, Germany
- 13 Gerhard Fieseler Werke G m b H, Kassel, Germany
- 14 Wiener Neustaedter Flugzeugwerke, Wiener Neustadt, Austria

Aero Engines Branch

- 15 Bussing NAG Flugmotorenwerke G m b H, Brunswick, Germany
- 16 Mittel-Deutsche Motorenwerke G m b H, Taucha, Germany
- 17 Bavarian Motor Works Inc, Eisenach & Durrerhof, Germany
- 18 Bayerische Motorenwerke A G (BMW) Munich, Germany
- 19 Henschel Flugmotorenwerke, Kassel, Germany

Light Metal Branch

- 20 Light Metals Industry
 - Part I, Aluminum of Germany
 - Part II, Magnesium
- 21 Vereinigte Deutsche Metallwerke, Hildesheim, Germany
- 22 Metallgussgesellschaft G m b H, Leipzig, Germany
- 23 Aluminumwerke G m b H, Plant No. 2, Bitterfeld, Germany
- 24 Gebrueder Giuliani G m b H, Ludwigshafen, Germany
- 25 Luftschiffbau, Zeppelin G m b H, Friedrichshafen on Bodensee, Germany
- 26 Wieland Werke A G, Ulm, Germany
- 27 Rudolph Rautenbach Leichtmetallgiessereien, Solingen, Germany
- 28 Lippewerke Vereinigte Aluminiumwerke A G, Lunen, Germany
- 29 Vereinigte Deutsche Metallwerke, Hedderheim, Germany
- 30 Duerener Metallwerke A G, Duren Wittenau-Berlin & Waren, Germany

AREA STUDIES DIVISION

- *31 Area Studies Division Report
- 32 A Detailed Study of the Effects of Area Bombing on Hamburg
- 33 A Detailed Study of the Effects of Area Bombing on Wuppertal
- 34 A Detailed Study of the Effects of Area Bombing on Dusseldorf
- 35 A Detailed Study of the Effects of Area Bombing on Solingen
- 36 A Detailed Study of the Effects of Area Bombing on Remscheid
- 37 A Detailed Study of the Effects of Area Bombing on Darmstadt
- 38 A Detailed Study of the Effects of Area Bombing on Lubeck
- 39 A Brief Study of the Effects of Area Bombing on Berlin, Augsburg, Bochum, Leipzig, Hagen, Dortmund, Oberhausen, Schweinfurt, and Bremen

CIVILIAN DEFENSE DIVISION

- *40 Civilian Defense Division—Final Report
- 41 Cologne Field Report
- 42 Bonn Field Report
- 43 Hanover Field Report
- 44 Hamburg Field Report—Vol I, Text: Vol II, Exhibits
- 45 Bad Oldesloe Field Report
- 46 Augsburg Field Report
- 47 Reception Areas in Bavaria, Germany

EQUIPMENT DIVISION

Electrical Branch

- *48 German Electrical Equipment Industry Report
- 49 Brown Boveri et Cie, Mannheim Kafertal, Germany

Optical and Precision Instrument Branch

- *50 Optical and Precision Instrument Industry Report

Abrasives Branch

- *51 The German Abrasive Industry
- 52 Mayer and Schmidt, Offenbach on Main, Germany

Anti-Friction Branch

- *53 The German Anti-Friction Bearings Industry

Machine Tools Branch

- *54 Machine Tools & Machinery as Capital Equipment
- *55 Machine Tool Industry in Germany
- 56 Herman Kolb Co., Cologne, Germany
- 57 Collet and Engelhard, Offenbach, Germany
- 58 Naxos Union, Frankfort on Main, Germany

MILITARY ANALYSIS DIVISION

- 59 The Defeat of the German Air Force
- 60 V-Weapons (Crossbow) Campaign
- 61 Air Force Rate of Operation
- 62 Weather Factors in Combat Bombardment Operations in the European Theatre
- 63 Bombing Accuracy, USAAF Heavy and Medium Bombers in the ETO
- 64 Description of RAF Bombing
- 64a The Impact of the Allied Air Effort on German Logistics

MORALE DIVISION

- *64b The Effects of Strategic Bombing on German Morale (Vol I & II)

Medical Branch

- *65 The Effect of Bombing on Health and Medical Care in Germany

MUNITIONS DIVISION

Heavy Industry Branch

- *66 The Coking Industry Report on Germany
- 67 Coking Plant Report No. 1, Sections A, B, C, & D
- 68 Gutehoffnungshuette, Oberhausen, Germany
- 69 Friedrich-Alfred Huette, Rheinhausen, Germany
- 70 Neunkirchen Eisenwerke A G, Neunkirchen, Germany
- 71 Reichswerke Hermann Goering A G, Hallendorf, Germany
- 72 August Thyssen Huette A G, Hamborn, Germany
- 73 Friedrich Krupp A G, Borbeck Plant, Essen, Germany
- 74 Dortmund Hoerder Huettenverein, A G, Dortmund, Germany
- 75 Hoesch A G, Dortmund, Germany
- 76 Bochumer Verein fuer Gusstahlfabrikation A G, Bochum, Germany

Motor Vehicles and Tanks Branch

- *77 German Motor Vehicles Industry Report
- *78 Tank Industry Report
- 79 Daimler Benz A G, Unterturkheim, Germany
- 80 Renault Motor Vehicles Plant, Billancourt, Paris
- 81 Adam Opel, Russelheim, Germany
- 82 Daimler Benz-Gaggenau Works, Gaggenau, Germany
- 83 Maschinenfabrik Augsburg-Nurnberg, Nurnberg, Germany
- 84 Auto Union A G, Chemnitz and Zwickau, Germany
- 85 Henschel & Sohn, Kassel, Germany
- 86 Maybach Motor Works, Friedrichshafen, Germany
- 87 Voigtlander, Maschinenfabrik A G, Plauen, Germany
- 88 Volkswagenwerke, Fallersleben, Germany
- 89 Bussing NAG, Brunswick, Germany
- 90 Muehlenbau Industrie A G (Miag) Brunswick, Germany
- 91 Friedrich Krupp Grusonwerke, Magdeburg, Germany

Submarine Branch

- 92 German Submarine Industry Report
- 93 Maschinenfabrik Augsburg-Nurnberg A G, Augsburg, Germany
- 94 Blohm and Voss Shipyards, Hamburg, Germany
- 95 Deutsche Werke A. G, Kiel, Germany
- 96 Deutsche Schiff und Maschinenbau, Bremen, Germany
- 97 Friedrich Krupp Germaniawerft, Kiel, Germany
- 98 Howaldtswerke A G, Hamburg, Germany
- 99 Submarine Assembly Shelter, Farge, Germany
- 100 Bremer Vulkan, Vegesack, Germany

Ordnance Branch

- *101 Ordnance Industry Report
- 102 Friedrich Krupp Grusonwerke A G Magdeburg, Germany
- 103 Bochumer Verein fuer Gusstahlfabrikation A G, Bochum, Germany
- 104 Henschel & Sohn, Kassel, Germany
- 105 Rheinmetall-Borsig, Dusseldorf, Germany
- 106 Hermann Goering Werke, Braunschweig, Hallendorf, Germany
- 107 Hannoverische Maschinenbau, Hanover, Germany
- 108 Gusstahlfabrik Friedrich Krupp, Essen, Germany

OIL DIVISION

- *109 Oil Division, Final Report
- *110 Oil Division, Final Report, Appendix
- *111 Powder, Explosives, Special Rockets and Jet Propellants, War Gases and Smoke Acid (Ministerial Report #1)
- 112 Underground and Dispersal Plants in Greater Germany
- 113 The German Oil Industry, Ministerial Report Team 78
- 114 Ministerial Report on Chemicals

Oil Branch

- 115 Ammoniakwerke Merseburg G m b H, Leuna, Germany—2 Appendices

- 116 Braunkohle Benzin A G, Zeitz and Bohlen, Germany; Wintershall A G, Leutzkendorf, Germany
- 117 Ludwigshafen-Oppau Works of I G Farbenindustrie A G, Ludwigshafen, Germany
- 118 Ruhroel Hydrogenation Plant, Bottrop-Boy, Germany, Vol. I, Vol. II
- 119 Rhenania Ossag Mineraloelwerke A G, Harburg Refinery, Hamburg, Germany
- 120 Rhenania Ossag Mineraloelwerke A G, Grasbrook Refinery, Hamburg, Germany
- 121 Rhenania Ossag Mineraloelwerke A G, Wilhelmshurg Refinery, Hamburg, Germany
- 122 Gewerkschaft Victor, Castrop-Rauxel, Germany, Vol. I & Vol. II
- 123 Europaeische Tanklager und Transport A G, Hamburg, Germany
- 124 Ebano Asphalt Werke A G, Harburg Refinery, Hamburg, Germany
- 125 Meerbeck Rheinpreussen Synthetic Oil Plant—Vol. I & Vol. II

Rubber Branch

- 126 Deutsche Dunlop Gummi Co., Hanau on Main, Germany
- 127 Continental Gummiwerke, Hanover, Germany
- 128 Huels Synthetic Rubber Plant
- 129 Ministerial Report on German Rubber Industry

Propellants Branch

- 130 Elektrochemischewerke, Munich, Germany
- 131 Schoenebeck Explosive Plant, Lignose Sprengstoff Werke G m b H, Bad Salzemen, Germany
- 132 Plants of Dynamit A G, Vormal, Alfred Nobel & Co, Troisdorf, Clausthal, Drummel and Duneberg, Germany
- 133 Deutsche Sprengchemie G m b H, Kraiburg, Germany

OVER-ALL ECONOMIC EFFECTS DIVISION

- 134 Over-all Economic Effects Division Report

Gross National Product.....	}	Special papers which together comprise the above report
Kriegseilberichte		
Hermann Goering Works.....		
Food and Agriculture.....		
- 134a Industrial Sales Output and Productivity

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- 134b Physical Damage Division Report (ETO)
- 135 Villacoublay Airdrome, Paris, France
- 136 Railroad Repair Yards, Malines, Belgium
- 137 Railroad Repair Yards, Louvain, Belgium
- 138 Railroad Repair Yards, Hasselt, Belgium
- 139 Railroad Repair Yards, Namur, Belgium
- 140 Submarine Pens, Brest, France
- 141 Powder Plant, Angouleme, France
- 142 Powder Plant, Bergerac, France
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